COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL REQUEST FOR INFORMATION
DATED JULY 8, 2016

13. Refer to pages VI-3, VI-4, and VI-5 of the depreciation study. Provide similar schedules for the present depreciation rates.

Response:

Page VI-3 represents text and not a schedule. Additionally, the information on pages VI-4 and VI-5 are calculated based on the parameters such as life, net salvage, depreciation procedure and surviving plant. Therefore, it is not possible to provide a similar schedule for present depreciation rates, however, the attached schedule, Attachment A to AG 1-13, sets forth the proforma expense using the present depreciation rates.

COLUMBIA GAS OF KENTUCKY, INC.

CALCULATION OF PRO FORMA EXPENSE USING CURRENT ANNUAL ACCRUAL RATES
RELATED TO GAS PLANT AS OF DECEMBER 31, 2015

	DEPRECIABLE GROUP	ORIGINAL COST AS OF DECEMBER 31, 2015	CURRENT ANNUAL ACCRUAL RATE	PRO FORMA EXPENSE
	(1)	(2)	(3)	(4)=(2)*(3)
DEPRECIABLE PLANT				
DISTRIBUTION PLANT				
	LAND AND LAND RIGHTS			
374.4	LAND RIGHTS	661,305.66	1.53	10,118
374.5	RIGHTS-OF-WAY	2,666,575.55	1.22	32,532
	TOTAL ACCOUNT 374	3,327,881.21		42,650
	STRUCTURES AND IMPROVEMENTS			
375.34	MEASURING AND REGULATING	1,868,813.92	1.96	36,629
375.7	OTHER DISTRIBUTION SYSTEM STRUCTURES			
	DISTRIBUTION SYSTEM STRUCTURES	7,807,297.57	1.99	155,365
	OTHER BUILDINGS	162,502.60	1.99	3,234
	TOTAL ACCOUNT 375.7	7,969,800.17		158,599
	TOTAL ACCOUNT 375	9,838,614.09		195,228
376	MAINS			
	CAST IRON	222,637.37	1.57	3,495
	BARE STEEL	17,458,363.07	1.57	274,096
	COATED STEEL	62,001,629.58	1.57	973,426
	PLASTIC	118,726,602.05	1.57	1,864,008
	TOTAL ACCOUNT 376	198,409,232.07		3,115,025
378	MEASURING AND REGULATING STATION EQUIPMENT - GENERAL	9,992,551.53	2.35	234,825
379.1	MEASURING AND REGULATING STATION EQUIPMENT - CITY GATE	254,900.59	2.27	5,786
380	SERVICES	115,258,005.47	2.59	2,985,182
381	METERS	13,270,915.01	2.59	343,717
381.1	METERS - AMI	8,705,079.06	2.59	225,462
382	METER INSTALLATIONS	8,991,831.33	2.39	214,905
383	HOUSE REGULATORS	5,504,717.40	1.39	76,516
384	HOUSE REGULATOR INSTALLATIONS	2,257,522.00	1.10	24,833
385	INDUSTRIAL MEASURING AND REGULATING STATION EQUIPMENT	3,047,363.19	2.09	63,690
387.4	OTHER EQUIPMENT - CUSTOMER INFORMATION SERVICES	4,461,168.45	2.34	104,391
TOTAL DISTRIBUTION PLANT		**383,319,781.40**		**7,632,210**
GENERAL PLANT				
	OFFICE FURNITURE AND EQUIPMENT			
391.1	FURNITURE	713,480.71	5.00	35,674
391.11	EQUIPMENT	18,815.57	6.67	1,255
391.12	INFORMATION SYSTEMS	668,137.98	20.00	133,628
	TOTAL ACCOUNT 391	1,400,434.26		170,557
392.2	TRANSPORTATION EQUIPMENT - TRAILERS	120,240.20	2.94	3,535
394	TOOLS, SHOP AND GARAGE EQUIPMENT	2,945,416.95	4.00	117,817
395	LABORATORY EQUIPMENT	9,257.77	5.00	463
396	POWER OPERATED EQUIPMENT	258,254.72	-	0
398	MISCELLANEOUS EQUIPMENT			
	FULLY ACCRUED	3,290.19	-	0
	AMORTIZED	87,786.75	6.67	5,855
	TOTAL ACCOUNT 398	91,076.94		5,855
TOTAL GENERAL PLANT		**4,824,680.84**		**298,227**
TOTAL DEPRECIABLE PLANT		**388,144,462.24**		**7,930,437**
AMORTIZABLE PLANT				
303	MISCELLANEOUS INTANGIBLE PLANT	5,340,619.47	*	767,437
375.71	STRUCTURES AND IMPROVEMENTS - LEASEHOLDS	259,808.94	*	58,686
378.21	MEASURING AND REGULATING STATION EQUIPMENT - FMV	(777,092.00)	**	(25,903)
TOTAL AMORTIZABLE PLANT		**4,823,336.41**		**800,220**
TOTAL GAS PLANT		**392,967,798.65**		**8,730,657**

COLUMBIA GAS OF KENTUCKY, INC.

CALCULATION OF PRO FORMA EXPENSE USING CURRENT ANNUAL ACCRUAL RATES
RELATED TO GAS PLANT AS OF DECEMBER 31, 2015

DEPRECIABLE GROUP	ORIGINAL COST AS OF DECEMBER 31, 2015	CURRENT ANNUAL ACCRUAL RATE	PRO FORMA EXPENSE
(1)	(2)	(3)	(4)=(2)*(3)

* Expense calculated individually for each asset.
** Expense calculated using 30 year amortization period.

COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
REQUEST FOR INFORMATION
DATED JULY 8, 2016

14. Confirm that it is Mr. Spanos' practice to provide a side by side comparison of present depreciation rates to proposed depreciation rates in his depreciation studies.

Response:

It is not Mr. Spanos' practice to provide a side by side comparison of present depreciation rates to proposed depreciation rates in his depreciation studies.

COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL REQUEST FOR INFORMATION
DATED JULY 8, 2016

15. Explain why Mr. Spanos did not provide a side by side comparison of present depreciation rates to proposed depreciation rates in the depreciation study in this proceeding.

Response:

Mr. Spanos does not provide side by side comparisons of present depreciation rates to proposed depreciation rates in his depreciation studies. Comparisons of current to proposed rates generally have too many factors which influence a rate which can be misleading. Each depreciation study is developed to establish the most appropriate rate at that point in time with the information known at that time. A depreciation study is not a results oriented calculation.

COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
REQUEST FOR INFORMATION
DATED JULY 8, 2016

16. Provide a side by side comparison of the present depreciation rates, proposed depreciation rates using the ELG procedure and depreciation rates using the ALG procedure by plant account/subaccount, including each component of the depreciation rates, e.g., depreciation rate excluding net salvage, net salvage rate, and depreciation rate including net salvage.

Response:

The attached schedule, Attachment A to AG 1-16, sets forth a comparison by account of the current depreciation rates, proposed depreciation rates using the ELG procedure, and depreciation rates using the ASL procedure. Each of the rates are also segregated into the three components.

COLUMBIA GAS OF KENTUCKY, INC.

COMPARISON OF ANNUAL ACCRUAL RATES BY COMPONENT AS OF DECEMBER 31, 2015
CURRENT VS. PROPOSED VS. ASL

		CURRENT				PROPOSED				ASL			
	DEPRECIABLE GROUP	ANNUAL ACCRUAL RATE	CAPITAL RECOVERY RATE	COST OF REMOVAL RATE	GROSS SALVAGE RATE	ANNUAL ACCRUAL RATE	CAPITAL RECOVERY RATE	COST OF REMOVAL RATE	GROSS SALVAGE RATE	ANNUAL ACCRUAL RATE	CAPITAL RECOVERY RATE	COST OF REMOVAL RATE	GROSS SALVAGE RATE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
DEPRECIABLE PLANT													
DISTRIBUTION PLANT													
	LAND AND LAND RIGHTS												
374.4	LAND RIGHTS	1.53	1.53	0.00	0.00	1.74	1.74	0.00	0.00	1.40	1.40	0.00	0.00
374.5	RIGHTS-OF-WAY	1.22	1.22	0.00	0.00	1.29	1.29	0.00	0.00	1.23	1.23	0.00	0.00
	TOTAL ACCOUNT 374												
	STRUCTURES AND IMPROVEMENTS												
375.34	MEASURING AND REGULATING	1.96	1.78	0.18	0.00	3.18	2.65	0.53	0.00	2.17	1.81	0.36	0.00
375.7	OTHER DISTRIBUTION SYSTEM STRUCTURES	1.99	1.99	0.00	0.00	2.13	2.13	0.00	0.00	2.13	2.13	0.00	0.00
376	MAINS	1.57	1.36	0.26	(0.05)	2.30	1.92	0.40	(0.02)	1.65	1.37	0.29	(0.01)
378	MEASURING AND REGULATING STATION EQUIPMENT - GENERAL	2.35	2.24	0.13	(0.02)	3.32	2.89	0.49	(0.06)	2.20	1.91	0.33	(0.04)
379.1	MEASURING AND REGULATING STATION EQUIPMENT - CITY GATE	2.27	2.16	0.13	(0.02)	0.60	0.52	0.09	(0.01)	0.52	0.45	0.08	(0.01)
380	SERVICES	2.59	1.73	0.86	0.00	5.10	3.09	2.01	0.00	3.80	2.30	1.50	0.00
381	METERS	2.59	2.59	0.00	0.00	3.30	3.44	0.03	(0.17)	2.62	2.73	0.03	(0.14)
381.1	METERS - AMI	2.59	2.59	0.00	0.00	8.06	8.06	0.00	0.00	7.21	7.21	0.00	0.00
382	METER INSTALLATIONS	2.39	2.27	0.14	(0.02)	2.44	2.32	0.14	(0.02)	2.08	1.98	0.12	(0.02)
383	HOUSE REGULATORS	1.39	1.32	0.08	(0.01)	2.73	2.60	0.18	(0.05)	2.25	2.14	0.15	(0.04)
384	HOUSE REGULATOR INSTALLATIONS	1.10	1.10	0.00	0.00	1.01	1.01	0.00	0.00	0.83	0.83	0.00	0.00
385	INDUSTRIAL MEASURING AND REGULATING STATION EQUIPMENT	2.09	1.99	0.14	(0.04)	5.08	4.62	0.55	(0.09)	3.64	3.31	0.40	(0.07)
387.4	OTHER EQUIPMENT - CUSTOMER INFORMATION SERVICES	2.34	2.34	0.00	0.00	3.74	3.56	0.18	0.00	3.13	2.98	0.15	0.00
GENERAL PLANT													
	OFFICE FURNITURE AND EQUIPMENT												
391.1	FURNITURE	5.00	5.00	0.00	0.00	5.00	5.00	0.00	0.00	5.00	5.00	0.00	0.00
391.11	EQUIPMENT	6.67	6.67	0.00	0.00	6.67	6.67	0.00	0.00	6.67	6.67	0.00	0.00
391.12	INFORMATION SYSTEMS	20.00	20.00	0.00	0.00	20.00	20.00	0.00	0.00	20.00	20.00	0.00	0.00
392.2	TRANSPORTATION EQUIPMENT - TRAILERS	2.94	2.94	0.00	0.00	9.15	10.17	0.00	(1.02)	8.27	9.19	0.00	(0.92)
394	TOOLS, SHOP AND GARAGE EQUIPMENT	4.00	4.00	0.00	0.00	4.00	4.00	0.00	0.00	4.00	4.00	0.00	0.00
395	LABORATORY EQUIPMENT	5.00	5.00	0.00	0.00	5.00	5.00	0.00	0.00	5.00	5.00	0.00	0.00
396	POWER OPERATED EQUIPMENT	0.00	0.00	0.00	0.00	2.59	2.88	0.00	(0.29)	2.11	2.34	0.00	(0.23)
398	MISCELLANEOUS EQUIPMENT												
	FULLY ACCRUED	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	AMORTIZED	6.67	6.67	0.00	0.00	6.67	6.67	0.00	0.00	6.67	6.67	0.00	0.00

COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
REQUEST FOR INFORMATION
DATED JULY 8, 2016

17. Provide all cost benefit analyses for the proposed training center compared to the status quo.

Response:

Please refer to Columbia Gas of Kentucky's Application for a Declaratory Order, Case No. 2016-00181 for a complete description of the proposed training center and related costs and benefits.

COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
REQUEST FOR INFORMATION
DATED JULY 8, 2016

18. Provide all cost benefit analyses for each of the proposed "strategic" O&M expense initiatives compared to the status quo.

Response:

These strategic initiatives are proactive programs designed to reduce risk associated with our pipeline facilities to enhance public and employee safety.The timing aligns to take advantage of Columbia's accelerated infrastructure replacement program, existing operational programs and anticipated federal regulations. These initiatives will not produce easily quantifiable cost/benefits as they are intended to reduce risk and strategically address public and employee safety. The strategic initiatives include programs defined in testimony such as:

GPS Program;

Cross Bore Program;

Enhanced OQ Program;

3rd Party Damage Prevention Program;

Meter Protection Identification; and

Training Center & Curriculum Development.

COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
REQUEST FOR INFORMATION
DATED JULY 8, 2016

19. Refer to page 7 lines 1-7 of Ms. Fischer's Direct Testimony wherein she addresses the "tax repairs deduction."

a. Confirm that the tax repairs deduction is not subject to the normalization provisions of the IRC.

b. Confirm that the tax repairs deduction contributed in part to the Company's NOL ADIT in account 190 at December 31, 2015, August 31, 2016, December 31, 2016, and December 31, 2017. Explain your response in complete detail.

Response:

a. Yes, the tax repairs deduction is not subject to the normalization provisions of the IRC. The tax repairs deduction results in a reduction to tax basis upon which tax depreciation is calculated.

b. The tax repairs deduction did not contribute to the Columbia's NOL ADIT. The level of accelerated tax depreciation deductions (including bonus depreciation) is such that this caused Columbia to be in an NOL even without taking any deductions for tax repairs. In calculating Columbia's ADIT NOL, the Columbia used the "last dollars deducted" methodology which ensures that the portion of the ADIT NOL attributable to accelerated depreciation is correctly taken into account. The last dollars deducted methodology calculates the NOL with and without accelerated depreciation. This methodology provides certainty and prevents the possibility of "flow through" of the benefits of accelerated depreciation which is a violation of the normalization rules of Internal Revenue Code Section 1.167(1). Please see AG 1-19 Attachment A for a calculation of the NOL under this methodology.

Columbia Gas of Kentucky
Taxable Income

KY PSC Case No. 2016-000162
Attachment A to AG Set 1-019(b)

Line No		2011	2012	2013	2014	2015-n1	12/31/2015 Total
1	Federal Taxable Income/(Loss)	(2,630,715)	4,548,835	366,922	(33,692)	(4,231,339)	(1,979,989)
2	Bonus Depr	(12,978,740)	(7,226,250)	(7,881,049)	(12,336,491)	(12,162,182)	(52,584,712)
3	Tax Depr-Non Bonus	(6,080,068)	(5,958,075)	(5,661,324)	(6,112,446)	(7,054,637)	(30,866,550)
4	Subtotal	(19,058,808)	(13,184,325)	(13,542,373)	(18,448,937)	(19,216,819)	(83,451,262)
5	Federal Taxable Income/(Loss) without Bonus	16,428,093	N/A	N/A	18,415,245	14,985,480	49,828,818
6	Non Depr ADIT-NOL (If Line 5<0,Line 5 x 35%)	-	N/A	N/A	-	-	-
7	ADIT-NOL Creation [(Line 1 x 35%) - Line 6]	920,750	-	-	11,792	1,480,969	2,413,511
8	NOL Utilized	(746,259)					(746,259)
9	Remaining NOL ADIT (Lines 7+8)	174,491	-	-	11,792	1,480,969	1,667,252

n1-This is the estimated taxable income as of 12-31-15. The 2015 return has not been completed yet.

COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
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DATED JULY 8, 2016

20. Refer to page 9 lines 6-8 of Ms. Fischer's Direct Testimony wherein she addresses the federal NOL ADIT and quantifies it as $1,258,107 (WPB-6 Sheet 2 of 3).

a. Provide the calculation of the amount at December 31, 2016 shown on WPB-6 Sheet 2 of 3 starting with the year in which the NOL carryforward originated and the change in the amount for each month since that date through December 31, 2017. Provide all data, assumptions, and workpapers, including electronic spreadsheets in live format with all formulas intact. In addition, provide a narrative explanation of the calculation so that it can be understood and replicated.

b. Confirm that this amount was calculated before the increase in taxable income that will result from any rate increase in this proceeding.

c. If the response to part (b) of this question is "confirmed," then confirm that the Company agrees the NOL ADIT will be reduced based on the rate increase authorized in this proceeding, all else equal.

d. Confirm that the NOL ADIT will be eliminated if the Commission grants the rate increase requested in this proceeding, all else equal.

Response:

a. Please see AG 1-20 Attachment A filed in this docket as CKY_R_AGDR1_NUM20_Attachment A_072216 for the calculation of the monthly change in the ADIT NOL carryforward from December 31, 2016 to December 31, 2017 and for a calculation of the annual NOL change from years 2016-2017. Please see Attachment A in the response to AG Set 1-21(d) for the calculation of the ADIT NOL origination.

b. The level of ADIT NOL was calculated before any potential change to taxable income that will result from any rate increase in this proceeding.

c. If all other factors remain unchanged and there is a rate increase sufficient to utilize NOL, then the NOL ADIT amount should be reduced, however in order for Columbia to monetize its NOL, the consolidated group must have taxable income since Columbia files as part of the consolidated group for federal return purposes.

d. The NOL ADIT could be eliminated if the Commission grants a rate increase in this proceeding, all else equal. As explained in the response to AG Set 1-20(c) the consolidated group in which Columbia files a federal return must utilize NOL in order for the Columbia's NOL to be monetized.

COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
REQUEST FOR INFORMATION
DATED JULY 8, 2016

21. Refer to page 9 lines 2-6 of Ms. Fischer's Direct Testimony.

a. Provide a copy of all "rulings" relied on for this statement.

b. Confirm that the "rulings" address only the tax depreciation deductions and that the NOL ADIT can be reduced for any deductions other than tax depreciation that contributed to the NOL ADIT.

c. Confirm that it is the Company's understanding of the Regulation and the "rulings" that the NOL ADIT must be included in rate base to avoid a normalization violation only to the extent that the NOL carryforward was caused by tax depreciation. Explain your response in complete detail.

d. Provide a calculation of the NOL ADIT that is limited to the tax depreciation deduction and that conforms to the Company's understanding of the Regulation and the "rulings" necessary to avoid a normalization violation.

Provide all data, assumptions, and workpapers, including electronic spreadsheets in live format with formulas intact.

Response:

a. Please see AG 1-21 Attachment A for a copy of rulings relied on in the determination to include the ADIT NOL in rate base.

b. Yes, the normalization rules apply only to the preservation of the benefits of accelerated tax depreciation deductions. To the extent an NOL results from taking accelerated tax depreciation deductions, it is a requirement to include that portion of the NOL ADIT in rate base to avoid a normalization violation. The rulings address the acceptable method upon which the NOL ADIT includible in rate base should be calculated in order to avoid a normalization violation as explained in the response to AG Set 1-019(b).

c. Please see the response to AG Set 1-021(b).

d. Please see Attachment B filed in this docket as CKY_R_AGDR1_NUM21_Attachment_B_072216

Internal Revenue Service

Number: **201436037**
Release Date: 9/5/2014
Index Number: 167.22-01

Department of the Treasury
Washington, DC 20224

Third Party Communication: None
Date of Communication: Not Applicable

Person To Contact:
, ID No.
Telephone Number:

Refer Reply To:
CC:PSI:B06
PLR-148310-13
Date:
May 22, 2014

LEGEND:

Taxpayer =

Parent =

State A =
State B =
State C =
Commission A =
Commission B =
Commission C =
Year A =
Year B =
Date A =
Date B =
Date C =
Case =
Director =

Dear :

This letter responds to the request, dated November 25, 2013, of Taxpayer for a ruling on the application of the normalization rules of the Internal Revenue Code to certain accounting and regulatory procedures, described below.

The representations set out in your letter follow.

Taxpayer is a regulated public utility incorporated in State A and State B. It is wholly owned by Parent. Taxpayer is engaged in the transmission, distribution, and supply of electricity in State A and State C. Taxpayer is subject to the regulatory jurisdiction of Commission A, Commission B, and Commission C with respect to terms and conditions of service and particularly the rates it may charge for the provision of service. Taxpayer's rates are established on a rate of return basis. Taxpayer takes accelerated depreciation, including "bonus depreciation" where available and, for each year beginning in Year A and ending in Year B, Taxpayer individually (as well as the consolidated return filed by Parent) has or expects to, produce a net operating loss (NOL). On its regulatory books of account, Taxpayer "normalizes" the differences between regulatory depreciation and tax depreciation. This means that, where accelerated depreciation reduces taxable income, the taxes that a taxpayer would have paid if regulatory depreciation (instead of accelerated tax depreciation) were claimed constitute "cost-free capital" to the taxpayer. A taxpayer that normalizes these differences, like Taxpayer, maintains a reserve account showing the amount of tax liability that is deferred as a result of the accelerated depreciation. This reserve is the accumulated deferred income tax (ADIT) account. Taxpayer maintains an ADIT account. In addition, Taxpayer maintains an offsetting series of entries – a "deferred tax asset" and a "deferred tax expense" - that reflect that portion of those 'tax losses' which, while due to accelerated depreciation, did not actually defer tax because of the existence of an net operating loss carryover (NOLC). Taxpayer, for normalization purposes, calculates the portion of the NOLC attributable to accelerated depreciation using a "with or without" methodology, meaning that an NOLC is attributable to accelerated depreciation to the extent of the lesser of the accelerated depreciation or the NOLC.

Taxpayer filed a general rate case with Commission B on Date A (Case). The test year used in the Case was the 12 month period ending on Date B. In computing its income tax expense element of cost of service, the tax benefits attributable to accelerated depreciation were normalized in accordance with Commission B policy and were not flowed thru to ratepayers. The data originally filed in Case included six months of forecast data, which the Taxpayer updated with actual data in the course of proceedings. In establishing the rate base on which Taxpayer was to be allowed to earn a return Commission B offset rate base by Taxpayer's ADIT balance, using a 13-month average of the month-end balances of the relevant accounts. Taxpayer argued that the ADIT balance should be reduced by the amounts that Taxpayer calculates did not actually defer tax due to the presence of the NOLC, as represented in the deferred tax asset account. Testimony by various other participants in Case argued against Taxpayer's proposed calculation of ADIT. One proposal made to Commission B was, if Commission B allowed Taxpayer to reduce the ADIT balance as Taxpayer proposed, then Taxpayer's income tax expense element of service should be reduced by that same amount.

Commission B, in an order issued on Date C, allowed Taxpayer to reduce ADIT by the amount that Taxpayer calculates did not actually defer tax due to the presence of the NOLC and ordered Taxpayer to seek a ruling on the effects of an NOLC on ADIT. Rates went into effect on Date C.

Taxpayer proposed, and Commission B accepted, that it be permitted to annualize, rather than average, its reliability plant additions and to extend the period of anticipated reliability plant additions to be included in rate base for an additional quarter. Taxpayer also proposed, and Commission B accepted, that no additional ADIT be reflected as a result of these adjustments inasmuch as any additional book and tax depreciation produced by considering these assets would simply increase Taxpayer's NOLC and thus there would be no net impact on ADIT.

Taxpayer requests that we rule as follows:

1. Under the circumstances described above, the reduction of Taxpayer's rate base by the full amount of its ADIT account balances offset by a portion of its NOLC-related account balance that is less than the amount attributable to accelerated depreciation computed on a "with or without" basis would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1 of the Income Tax regulations.
2. The imputation of incremental ADIT on account of the reliability plant addition adjustments described above would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1.
3. Under the circumstances described above, any reduction in Taxpayer's tax expense element of cost of service to reflect the tax benefit of its NOLC would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1.

Law and Analysis

Section 168(f)(2) of the Code provides that the depreciation deduction determined under section 168 shall not apply to any public utility property (within the meaning of section 168(i)(10)) if the taxpayer does not use a normalization method of accounting.

In order to use a normalization method of accounting, section 168(i)(9)(A)(i) of the Code requires the taxpayer, in computing its tax expense for establishing its cost of service for ratemaking purposes and reflecting operating results in its regulated books of account, to use a method of depreciation with respect to public utility property that is the same as, and a depreciation period for such property that is not shorter than, the method and period used to compute its depreciation expense for such purposes. Under section 168(i)(9)(A)(ii), if the amount allowable as a deduction under section 168 differs from the amount that-would be allowable as a deduction under section 167 using the method, period, first and last year convention, and salvage value used to compute regulated tax expense under section 168(i)(9)(A)(i), the taxpayer must make adjustments to a reserve to reflect the deferral of taxes resulting from such difference.

Section 168(i)(9)(B)(i) of the Code provides that one way the requirements of section 168(i)(9)(A) will not be satisfied is if the taxpayer, for ratemaking purposes, uses a procedure or adjustment which is inconsistent with such requirements. Under section 168(i)(9)(B)(ii), such inconsistent procedures and adjustments include the use of an estimate or projection of the taxpayer's tax expense, depreciation expense, or reserve for deferred taxes under section 168(i)(9)(A)(ii), unless such estimate or projection is also used, for ratemaking purposes, with respect to all three of these items and with respect to the rate base.

Former section 167(l) of the Code generally provided that public utilities were entitled to use accelerated methods for depreciation if they used a "normalization method of accounting." A normalization method of accounting was defined in former section 167(l)(3)(G) in a manner consistent with that found in section 168(i)(9)(A). Section 1.167(1)-1(a)(1) of the Income Tax Regulations provides that the normalization requirements for public utility property pertain only to the deferral of federal income tax liability resulting from the use of an accelerated method of depreciation for computing the allowance for depreciation under section 167 and the use of straight-line depreciation for computing tax expense and depreciation expense for purposes of establishing cost of services and for reflecting operating results in regulated books of account. These regulations do not pertain to other book-tax timing differences with respect to state income taxes, F.I.C.A. taxes, construction costs, or any other taxes and items.

Section 1.167(l)-1(h)(1)(i) provides that the reserve established for public utility property should reflect the total amount of the deferral of federal income tax liability resulting from the taxpayer's use of different depreciation methods for tax and ratemaking purposes.

Section 1.167(1)-1(h)(1)(iii) provides that the amount of federal income tax liability deferred as a result of the use of different depreciation methods for tax and ratemaking purposes is the excess (computed without regard to credits) of the amount the tax liability would have been had the depreciation method for ratemaking purposes been used over the amount of the actual tax liability. This amount shall be taken into account for the taxable year in which the different methods of depreciation are used. If, however, in respect of any taxable year the use of a method of depreciation other than a subsection (1) method for purposes of determining the taxpayer's reasonable allowance under section 167(a) results in a net operating loss carryover to a year succeeding such taxable year which would not have arisen (or an increase in such carryover which would not have arisen) had the taxpayer determined his reasonable allowance under section 167(a) using a subsection (1) method, then the amount and time of the deferral of tax liability shall be taken into account in such appropriate time and manner as is satisfactory to the district director.

Section 1.167(1)-1(h)(2)(i) provides that the taxpayer must credit this amount of deferred taxes to a reserve for deferred taxes, a depreciation reserve, or other reserve account. This regulation further provides that, with respect to any account, the aggregate amount allocable to deferred tax under section 167(1) shall not be reduced except to reflect the amount for any taxable year by which Federal income taxes are greater by reason of the prior use of different methods of depreciation. That section also notes that the aggregate amount allocable to deferred taxes may be reduced to reflect the amount for any taxable year by which federal income taxes are greater by reason of the prior use of different methods of depreciation under section 1.167(1)-1(h)(1)(i) or to reflect asset retirements or the expiration of the period for depreciation used for determining the allowance for depreciation under section 167(a).

Section 1.167(1)-(h)(6)(i) provides that, notwithstanding the provisions of subparagraph (1) of that paragraph, a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes under section 167(l) which is excluded from the base to which the taxpayer's rate of return is applied, or which is treated as no-cost capital in those rate cases in which the rate of return is based upon the cost of capital, exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking.

Section 1.167(1)-(h)(6)(ii) provides that, for the purpose of determining the maximum amount of the reserve to be excluded from the rate base (or to be included as no-cost capital) under subdivision (i), above, if solely an historical period is used to determine depreciation for Federal income tax expense for ratemaking purposes, then the amount of the reserve account for that period is the amount of the reserve (determined under section 1.167(1)-1(h)(2)(i)) at the end of the historical period. If such determination is made by reference both to an historical portion and to a future portion of a period, the amount of the reserve account for the period is the amount of the reserve at the end of the historical portion of the period and a pro rata portion of the amount of any projected increase to be credited or decrease to be charged to the account during the future portion of the period.

Section 1.167(l)-1(h) requires that a utility must maintain a reserve reflecting the total amount of the deferral of federal income tax liability resulting from the taxpayer's use of different depreciation methods for tax and ratemaking purposes. Taxpayer has done so. Section 1.167(1)-(h)(6)(i) provides that a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes which is excluded from the base to which the taxpayer's rate of return is applied, or which is treated as no-cost capital in those rate cases in which the rate of return is based upon the cost of capital, exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking. Section 56(a)(1)(D) provides that, with respect to public utility property the Secretary shall prescribe the requirements of a normalization method of accounting for that section.

In Case, Commission B has reduced rate base by Taxpayer's ADIT account, as modified by the account which Taxpayer has designed to calculate the effects of the NOLC. Section 1.167(1)-1(h)(1)(iii) makes clear that the effects of an NOLC must be taken into account for normalization purposes. Further, while that section provides no specific mandate on methods, it does provide that the Service has discretion to determine whether a particular method satisfies the normalization requirements. Section 1.167(1)-(h)(6)(i) provides that a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes which is excluded from the base to which the taxpayer's rate of return is applied, or which is treated as no-cost capital in those rate cases in which the rate of return is based upon the cost of capital, exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking. Because the ADIT account, the reserve account for deferred taxes, reduces rate base, it is clear that the portion of an NOLC that is attributable to accelerated depreciation must be taken into account in calculating the amount of the reserve for deferred taxes (ADIT). Thus, the order by Commission B is in accord with the normalization requirements. The "with or without" methodology employed by Taxpayer is specifically designed to ensure that the portion of the NOLC attributable to accelerated depreciation is correctly taken into account by maximizing the amount of the NOLC attributable to accelerated depreciation. This methodology provides certainty and prevents the possibility of "flow through" of the benefits of accelerated depreciation to ratepayers. Under these facts, any method other than the "with and without" method would not provide the same level of certainty and therefore the use of any other methodology is inconsistent with the normalization rules.

Regarding the second issue, § 1.167(1)-(h)(6)(i) provides, as noted above, that a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes which is excluded from the base to which the taxpayer's rate of return is applied exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking. Increasing Taxpayer's ADIT account by an amount representing those taxes that would have been deferred absent the NOLC increases the ADIT reserve account (which will then reduce rate base) beyond the permissible amount.

Regarding the third issue, reduction of Taxpayer's tax expense element of cost of service, we believe that such reduction would, in effect, flow through the tax benefits of accelerated depreciation deductions through to rate payers even though the Taxpayer has not yet realized such benefits. This would violate the normalization provisions.

We rule as follows:

1. Under the circumstances described above, the reduction of Taxpayer's rate base by the full amount of its ADIT account balances offset by a portion of its NOLC-related account balance that is less than the amount attributable to accelerated depreciation computed on a "with or without" basis would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1 of the Income Tax regulations.
2. The imputation of incremental ADIT on account of the reliability plant addition adjustments described above would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1.
3. Under the circumstances described above, any reduction in Taxpayer's tax expense element of cost of service to reflect the tax benefit of its NOLC would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1.

This ruling is based on the representations submitted by Taxpayer and is only valid if those representations are accurate. The accuracy of these representations is subject to verification on audit.

Except as specifically determined above, no opinion is expressed or implied concerning the Federal income tax consequences of the matters described above.

This ruling is directed only to the taxpayer who requested it. Section 6110(k)(3) of the Code provides it may not be used or cited as precedent. In accordance with the power of attorney on file with this office, a copy of this letter is being sent to your authorized representative. We are also sending a copy of this letter ruling to the Director.

Sincerely,

Peter C. Friedman
Senior Technician Reviewer, Branch 6
(Passthroughs & Special Industries)

cc:

Internal Revenue Service

Number: **201436038**
Release Date: 9/5/2014
Index Number: 167.22-01

Department of the Treasury
Washington, DC 20224

Third Party Communication: None
Date of Communication: Not Applicable

Person To Contact:
, ID No.
Telephone Number:

Refer Reply To:
CC:PSI:B06
PLR-148311-13
Date:
May 22, 2014

LEGEND:

Taxpayer =

Parent =

State A =
State B =
State C =
Commission A =
Commission B =
Commission C =
Year A =
Year B =
Date A =
Date B =
Date C =
Date D =
Date E =
Case =
Director =

Dear . :

This letter responds to the request, dated November 25, 2013, of Taxpayer for a ruling on the application of the normalization rules of the Internal Revenue Code to certain accounting and regulatory procedures, described below.

The representations set out in your letter follow.

Taxpayer is a regulated public utility incorporated in State A and State B. It is wholly owned, through a limited liability company, by Parent. Taxpayer is engaged in the transmission, distribution, and supply of electricity in State A and State C. Taxpayer also provides natural gas and natural gas transmission services in State A. Taxpayer is subject to the regulatory jurisdiction of Commission A, Commission B, and Commission C with respect to terms and conditions of service and particularly the rates it may charge for the provision of service. Taxpayer's rates are established on a rate of return basis. Taxpayer takes accelerated depreciation, including "bonus depreciation" where available and, for each year beginning in Year A and ending in Year B, Taxpayer individually (as well as the consolidated return filed by Parent) has or expects to, produce a net operating loss (NOL). On its regulatory books of account, Taxpayer "normalizes" the differences between regulatory depreciation and tax depreciation. This means that, where accelerated depreciation reduces taxable income, the taxes that a taxpayer would have paid if regulatory depreciation (instead of accelerated tax depreciation) were claimed constitute "cost-free capital" to the taxpayer. A taxpayer that normalizes these differences, like Taxpayer, maintains a reserve account showing the amount of tax liability that is deferred as a result of the accelerated depreciation. This reserve is the accumulated deferred income tax (ADIT) account. Taxpayer maintains an ADIT account. In addition, Taxpayer maintains an offsetting series of entries – a "deferred tax asset" and a "deferred tax expense" - that reflect that portion of those 'tax losses' which, while due to accelerated depreciation, did not actually defer tax because of the existence of an net operating loss carryover (NOLC). Taxpayer, for normalization purposes, calculates the portion of the NOLC attributable to accelerated depreciation using a "with or without" methodology, meaning that an NOLC is attributable to accelerated depreciation to the extent of the lesser of the accelerated depreciation or the NOLC.

Taxpayer filed a general rate case with Commission B on Date A (Case). The test year used in the Case was the 12 month period ending on Date B. In computing its income tax expense element of cost of service, the tax benefits attributable to accelerated depreciation were normalized in accordance with Commission B policy and were not flowed thru to ratepayers. The data originally filed in Case was updated in the course of proceedings. In establishing the rate base on which Taxpayer was to be allowed to earn a return Commission B offset rate base by Taxpayer's ADIT balance, using a 13-month average of the month-end balances of the relevant accounts. Taxpayer argued that the ADIT balance should be reduced by the amounts that Taxpayer calculates did not actually defer tax due to the presence of the NOLC, as represented in the deferred tax asset account. Testimony by various other participants in Case argued against Taxpayer's proposed calculation of ADIT.

On Date C, a settlement agreement was filed with Commission B, incorporating the Taxpayer's proposed treatment of the tax consequences of its NOLC. In an order issued on Date D, Commission B issued an order approving the settlement agreement and also ordered Taxpayer to seek a ruling on the effects of an NOLC on ADIT. Rates went into effect on Date E.

Taxpayer proposed, and Commission B accepted, that it be permitted to annualize, rather than average, its reliability plant additions and to extend the period of anticipated reliability plant additions to be included in rate base for an additional eight months. Taxpayer also proposed, and Commission B accepted, that no additional ADIT be reflected as a result of these adjustments inasmuch as any additional book and tax depreciation produced by considering these assets would simply increase Taxpayer's NOLC and thus there would be no net impact on ADIT.

Taxpayer requests that we rule as follows:

1. Under the circumstances described above, the reduction of Taxpayer's rate base by the full amount of its ADIT account balances offset by a portion of its NOLC-related account balance that is less than the amount attributable to accelerated depreciation computed on a "with or without" basis would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1 of the Income Tax regulations.
2. The imputation of incremental ADIT on account of the reliability plant addition adjustments described above would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1.

Law and Analysis

Section 168(f)(2) of the Code provides that the depreciation deduction determined under section 168 shall not apply to any public utility property (within the meaning of section 168(i)(10)) if the taxpayer does not use a normalization method of accounting.

In order to use a normalization method of accounting, section 168(i)(9)(A)(i) of the Code requires the taxpayer, in computing its tax expense for establishing its cost of service for ratemaking purposes and reflecting operating results in its regulated books of account, to use a method of depreciation with respect to public utility property that is the same as, and a depreciation period for such property that is not shorter than, the method and period used to compute its depreciation expense for such purposes. Under section 168(i)(9)(A)(ii), if the amount allowable as a deduction under section 168 differs from the amount that-would be allowable as a deduction under section 167 using the method, period, first and last year convention, and salvage value used to compute regulated tax expense under section 168(i)(9)(A)(i), the taxpayer must make adjustments to a reserve to reflect the deferral of taxes resulting from such difference.

Section 168(i)(9)(B)(i) of the Code provides that one way the requirements of section 168(i)(9)(A) will not be satisfied is if the taxpayer, for ratemaking purposes, uses a procedure or adjustment which is inconsistent with such requirements. Under section 168(i)(9)(B)(ii), such inconsistent procedures and adjustments include the use of an estimate or projection of the taxpayer's tax expense, depreciation expense, or reserve for deferred taxes under section 168(i)(9)(A)(ii), unless such estimate or projection is also used, for ratemaking purposes, with respect to all three of these items and with respect to the rate base.

Former section 167(l) of the Code generally provided that public utilities were entitled to use accelerated methods for depreciation if they used a "normalization method of accounting." A normalization method of accounting was defined in former section 167(l)(3)(G) in a manner consistent with that found in section 168(i)(9)(A). Section 1.167(1)-1(a)(1) of the Income Tax Regulations provides that the normalization requirements for public utility property pertain only to the deferral of federal income tax liability resulting from the use of an accelerated method of depreciation for computing the allowance for depreciation under section 167 and the use of straight-line depreciation for computing tax expense and depreciation expense for purposes of establishing cost of services and for reflecting operating results in regulated books of account. These regulations do not pertain to other book-tax timing differences with respect to state income taxes, F.I.C.A. taxes, construction costs, or any other taxes and items.

Section 1.167(l)-1(h)(1)(i) provides that the reserve established for public utility property should reflect the total amount of the deferral of federal income tax liability resulting from the taxpayer's use of different depreciation methods for tax and ratemaking purposes.

Section 1.167(1)-1(h)(1)(iii) provides that the amount of federal income tax liability deferred as a result of the use of different depreciation methods for tax and ratemaking purposes is the excess (computed without regard to credits) of the amount the tax liability would have been had the depreciation method for ratemaking purposes been used over the amount of the actual tax liability. This amount shall be taken into account for the taxable year in which the different methods of depreciation are used. If, however, in respect of any taxable year the use of a method of depreciation other than a subsection (1) method for purposes of determining the taxpayer's reasonable allowance under section 167(a) results in a net operating loss carryover to a year succeeding such taxable year which would not have arisen (or an increase in such carryover which would not have arisen) had the taxpayer determined his reasonable allowance under section 167(a) using a subsection (1) method, then the amount and time of the deferral of tax liability shall be taken into account in such appropriate time and manner as is satisfactory to the district director.

Section 1.167(1)-1(h)(2)(i) provides that the taxpayer must credit this amount of deferred taxes to a reserve for deferred taxes, a depreciation reserve, or other reserve account. This regulation further provides that, with respect to any account, the aggregate amount allocable to deferred tax under section 167(1) shall not be reduced except to reflect the amount for any taxable year by which Federal income taxes are greater by reason of the prior use of different methods of depreciation. That section also notes that the aggregate amount allocable to deferred taxes may be reduced to reflect the amount for any taxable year by which federal income taxes are greater by reason of the prior use of different methods of depreciation under section 1.167(1)-1(h)(1)(i) or to reflect asset retirements or the expiration of the period for depreciation used for determining the allowance for depreciation under section 167(a).

Section 1.167(1)-(h)(6)(i) provides that, notwithstanding the provisions of subparagraph (1) of that paragraph, a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes under section 167(l) which is excluded from the base to which the taxpayer's rate of return is applied, or which is treated as no-cost capital in those rate cases in which the rate of return is based upon the cost of capital, exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking.

Section 1.167(1)-(h)(6)(ii) provides that, for the purpose of determining the maximum amount of the reserve to be excluded from the rate base (or to be included as no-cost capital) under subdivision (i), above, if solely an historical period is used to determine depreciation for Federal income tax expense for ratemaking purposes, then the amount of the reserve account for that period is the amount of the reserve (determined under section 1.167(1)-1(h)(2)(i)) at the end of the historical period. If such determination is made by reference both to an historical portion and to a future portion of a period, the amount of the reserve account for the period is the amount of the reserve at the end of the historical portion of the period and a pro rata portion of the amount of any projected increase to be credited or decrease to be charged to the account during the future portion of the period.

Section 1.167(l)-1(h) requires that a utility must maintain a reserve reflecting the total amount of the deferral of federal income tax liability resulting from the taxpayer's use of different depreciation methods for tax and ratemaking purposes. Taxpayer has done so. Section 1.167(1)-(h)(6)(i) provides that a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes which is excluded from the base to which the taxpayer's rate of return is applied, or which is treated as no-cost capital in those rate cases in which the rate of return is based upon the cost of capital, exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking. Section 56(a)(1)(D) provides that, with respect to public utility property the Secretary shall prescribe the requirements of a normalization method of accounting for that section.

In Case, Commission B has reduced rate base by Taxpayer's ADIT account, as modified by the account which Taxpayer has designed to calculate the effects of the NOLC. Section 1.167(1)-1(h)(1)(iii) makes clear that the effects of an NOLC must be taken into account for normalization purposes. Further, while that section provides no specific mandate on methods, it does provide that the Service has discretion to determine whether a particular method satisfies the normalization requirements. Section 1.167(1)-(h)(6)(i) provides that a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes which is excluded from the base to which the taxpayer's rate of return is applied, or which is treated as no-cost capital in those rate cases in which the rate of return is based upon the cost of capital, exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking. Because the ADIT account, the reserve account for deferred taxes, reduces rate base, it is clear that the portion of an NOLC that is attributable to accelerated depreciation must be taken into account in calculating the amount of the reserve for deferred taxes (ADIT). Thus, the order by Commission B is in accord with the normalization requirements. The "with or without" methodology employed by Taxpayer is specifically designed to ensure that the portion of the NOLC attributable to accelerated depreciation is correctly taken into account by maximizing the amount of the NOLC attributable to accelerated depreciation. This methodology provides certainty and prevents the possibility of "flow through" of the benefits of accelerated depreciation to ratepayers. Under these facts, any method other than the "with and without" method would not provide the same level of certainty and therefore the use of any other methodology is inconsistent with the normalization rules.

Regarding the second issue, § 1.167(1)-(h)(6)(i) provides, as noted above, that a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes which is excluded from the base to which the taxpayer's rate of return is applied exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking. Increasing Taxpayer's ADIT account by an amount representing those taxes that would have been deferred absent the NOLC increases the ADIT reserve account (which will then reduce rate base) beyond the permissible amount.

We rule as follows:

1. Under the circumstances described above, the reduction of Taxpayer's rate base by the full amount of its ADIT account balances offset by a portion of its NOLC-related account balance that is less than the amount attributable to accelerated depreciation computed on a "with or without" basis would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1 of the Income Tax regulations.

2. The imputation of incremental ADIT on account of the reliability plant addition adjustments described above would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1.

This ruling is based on the representations submitted by Taxpayer and is only valid if those representations are accurate. The accuracy of these representations is subject to verification on audit.

Except as specifically determined above, no opinion is expressed or implied concerning the Federal income tax consequences of the matters described above.

This ruling is directed only to the taxpayer who requested it. Section 6110(k)(3) of the Code provides it may not be used or cited as precedent. In accordance with the power of attorney on file with this office, a copy of this letter is being sent to your authorized representative. We are also sending a copy of this letter ruling to the Director.

Sincerely,

Peter C. Friedman
Senior Technician Reviewer, Branch 6
(Passthroughs & Special Industries)

cc:

Internal Revenue Service

Number: **201548017**
Release Date: 11/27/2015
Index Number: 167.22-01

Department of the Treasury
Washington, DC 20224

Third Party Communication: None
Date of Communication: Not Applicable

Person To Contact:
, ID No.
Telephone Number:

Refer Reply To:
CC:PSI:B06
PLR-116998-15
Date:
August 19, 2015

LEGEND:

Taxpayer =

Parent =

State A =
State B =
Commission =
Year A =
Year B =
Date A =
Date B =
Case =
Director =

Dear :

This letter responds to the request, dated May 14, 2015, of Taxpayer for a ruling on the application of the normalization rules of the Internal Revenue Code to certain accounting and regulatory procedures, described below.

The representations set out in your letter follow.

Taxpayer is primarily engaged in the regulated distribution of natural gas in State A. It is incorporated in State B and is wholly owned by Parent. Taxpayer is subject to the regulatory jurisdiction of Commission with respect to terms and conditions of service and particularly the rates it may charge for the provision of service. Taxpayer's rates are established on a rate of return basis. Taxpayer takes accelerated depreciation, including "bonus depreciation" where available and, for each year beginning in Year A and ending in Year B, Taxpayer incurred net operating losses (NOL). On its regulatory books of account, Taxpayer "normalizes" the differences between regulatory depreciation and tax depreciation. This means that, where accelerated depreciation reduces taxable income, the taxes that a taxpayer would have paid if regulatory depreciation (instead of accelerated tax depreciation) were claimed constitute "cost-free capital" to the taxpayer. A taxpayer that normalizes these differences, like Taxpayer, maintains a reserve account showing the amount of tax liability that is deferred as a result of the accelerated depreciation. This reserve is the accumulated deferred income tax (ADIT) account. Taxpayer maintains an ADIT account. In addition, Taxpayer maintains an offsetting series of entries – a "deferred tax asset" and a "deferred tax expense" - that reflect that portion of those 'tax losses' which, while due to accelerated depreciation, did not actually defer tax because of the existence of an net operating loss carryover (NOLC). Taxpayer, for normalization purposes, calculates the portion of the NOLC attributable to accelerated depreciation using a "last dollars deducted" methodology, meaning that an NOLC is attributable to accelerated depreciation to the extent of the lesser of the accelerated depreciation or the NOLC.

Taxpayer filed a general rate case with Commission on Date A (Case). The test year used in the Case was the 12 month period ending on Date B. In computing its income tax expense element of cost of service, the tax benefits attributable to accelerated depreciation were normalized in accordance with Commission policy and were not flowed thru to ratepayers. In establishing the rate base on which Taxpayer was to be allowed to earn a return Commission offsets rate base by Taxpayer's ADIT balance. Taxpayer argued that the ADIT balance should be reduced by the amounts that Taxpayer calculates did not actually defer tax due to the presence of the NOLC, as represented in the deferred tax asset account. Testimony by various other participants in Case argued against Taxpayer's proposed calculation of ADIT. One proposal made to Commission was, if Commission allowed Taxpayer to reduce the ADIT balance as Taxpayer proposed, then an offsetting reduction should be made to Taxpayer's income tax expense element of service.

A Utility Law Judge upheld Taxpayer's position with respect to the NOLC-related ADIT and ordered Taxpayer to seek a ruling from the Internal Revenue Service on this matter. This request is in response to that order.

Taxpayer requests that we rule as follows:

1. Under the circumstances described above, the reduction of Taxpayer's rate base by the balance of its ADIT accounts unreduced by its NOLC-related deferred tax account would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1 of the Income Tax regulations.

2. Under the circumstances described above, the reduction of Taxpayer's rate base by the full amount of its ADIT account balances offset by a portion of its NOLC-related account balance that is less than the amount attributable to accelerated depreciation computed on a "last dollars deducted" basis would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1.
3. Under the circumstances described above, any reduction in Taxpayer's tax expense element of cost of service to reflect the tax benefit of its NOLC would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1.

Law and Analysis

Section 168(f)(2) of the Code provides that the depreciation deduction determined under section 168 shall not apply to any public utility property (within the meaning of section 168(i)(10)) if the taxpayer does not use a normalization method of accounting.

In order to use a normalization method of accounting, section 168(i)(9)(A)(i) of the Code requires the taxpayer, in computing its tax expense for establishing its cost of service for ratemaking purposes and reflecting operating results in its regulated books of account, to use a method of depreciation with respect to public utility property that is the same as, and a depreciation period for such property that is not shorter than, the method and period used to compute its depreciation expense for such purposes. Under section 168(i)(9)(A)(ii), if the amount allowable as a deduction under section 168 differs from the amount that-would be allowable as a deduction under section 167 using the method, period, first and last year convention, and salvage value used to compute regulated tax expense under section 168(i)(9)(A)(i), the taxpayer must make adjustments to a reserve to reflect the deferral of taxes resulting from such difference.

Section 168(i)(9)(B)(i) of the Code provides that one way the requirements of section 168(i)(9)(A) will not be satisfied is if the taxpayer, for ratemaking purposes, uses a procedure or adjustment which is inconsistent with such requirements. Under section 168(i)(9)(B)(ii), such inconsistent procedures and adjustments include the use of an estimate or projection of the taxpayer's tax expense, depreciation expense, or reserve for deferred taxes under section 168(i)(9)(A)(ii), unless such estimate or projection is also used, for ratemaking purposes, with respect to all three of these items and with respect to the rate base.

Former section 167(l) of the Code generally provided that public utilities were entitled to use accelerated methods for depreciation if they used a "normalization method of accounting." A normalization method of accounting was defined in former section 167(l)(3)(G) in a manner consistent with that found in section 168(i)(9)(A). Section 1.167(1)-1(a)(1) of the Income Tax Regulations provides that the normalization requirements for public utility property pertain only to the deferral of federal income tax liability resulting from the use of an accelerated method of depreciation for computing the allowance for depreciation under section 167 and the use of straight-line depreciation for computing tax expense and depreciation expense for purposes of establishing cost of services and for reflecting operating results in regulated books of account. These regulations do not pertain to other book-tax timing differences with respect to state income taxes, F.I.C.A. taxes, construction costs, or any other taxes and items.

Section 1.167(l)-1(h)(1)(i) provides that the reserve established for public utility property should reflect the total amount of the deferral of federal income tax liability resulting from the taxpayer's use of different depreciation methods for tax and ratemaking purposes.

Section 1.167(1)-1(h)(1)(iii) provides that the amount of federal income tax liability deferred as a result of the use of different depreciation methods for tax and ratemaking purposes is the excess (computed without regard to credits) of the amount the tax liability would have been had the depreciation method for ratemaking purposes been used over the amount of the actual tax liability. This amount shall be taken into account for the taxable year in which the different methods of depreciation are used. If, however, in respect of any taxable year the use of a method of depreciation other than a subsection (1) method for purposes of determining the taxpayer's reasonable allowance under section 167(a) results in a net operating loss carryover to a year succeeding such taxable year which would not have arisen (or an increase in such carryover which would not have arisen) had the taxpayer determined his reasonable allowance under section 167(a) using a subsection (1) method, then the amount and time of the deferral of tax liability shall be taken into account in such appropriate time and manner as is satisfactory to the district director.

Section 1.167(1)-1(h)(2)(i) provides that the taxpayer must credit this amount of deferred taxes to a reserve for deferred taxes, a depreciation reserve, or other reserve account. This regulation further provides that, with respect to any account, the aggregate amount allocable to deferred tax under section 167(1) shall not be reduced except to reflect the amount for any taxable year by which Federal income taxes are greater by reason of the prior use of different methods of depreciation. That section also notes that the aggregate amount allocable to deferred taxes may be reduced to reflect the amount for any taxable year by which federal income taxes are greater by reason of the prior use of different methods of depreciation under section 1.167(1)-1(h)(1)(i) or to reflect asset retirements or the expiration of the period for depreciation used for determining the allowance for depreciation under section 167(a).

Section 1.167(1)-(h)(6)(i) provides that, notwithstanding the provisions of subparagraph (1) of that paragraph, a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes under section 167(l) which is excluded from the base to which the taxpayer's rate of return is applied, or which is treated as no-cost capital in those rate cases in which the rate of return is based upon the cost of capital, exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking.

Section 1.167(1)-(h)(6)(ii) provides that, for the purpose of determining the maximum amount of the reserve to be excluded from the rate base (or to be included as no-cost capital) under subdivision (i), above, if solely an historical period is used to determine depreciation for Federal income tax expense for ratemaking purposes, then the amount of the reserve account for that period is the amount of the reserve (determined under section 1.167(1)-1(h)(2)(i)) at the end of the historical period. If such determination is made by reference both to an historical portion and to a future portion of a period, the amount of the reserve account for the period is the amount of the reserve at the end of the historical portion of the period and a pro rata portion of the amount of any projected increase to be credited or decrease to be charged to the account during the future portion of the period.

Section 1.167(l)-1(h) requires that a utility must maintain a reserve reflecting the total amount of the deferral of federal income tax liability resulting from the taxpayer's use of different depreciation methods for tax and ratemaking purposes. Taxpayer has done so. Section 1.167(1)-(h)(6)(i) provides that a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes which is excluded from the base to which the taxpayer's rate of return is applied, or which is treated as no-cost capital in those rate cases in which the rate of return is based upon the cost of capital, exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking. Section 56(a)(1)(D) provides that, with respect to public utility property the Secretary shall prescribe the requirements of a normalization method of accounting for that section.

Section 1.167(1)-1(h)(1)(iii) makes clear that the effects of an NOLC must be taken into account for normalization purposes. Further, while that section provides no specific mandate on methods, it does provide that the Service has discretion to determine whether a particular method satisfies the normalization requirements. Section 1.167(1)-(h)(6)(i) provides that a taxpayer does not use a normalization method of regulated accounting if, for ratemaking purposes, the amount of the reserve for deferred taxes which is excluded from the base to which the taxpayer's rate of return is applied, or which is treated as no-cost capital in those rate cases in which the rate of return is based upon the cost of capital, exceeds the amount of such reserve for deferred taxes for the period used in determining the taxpayer's expense in computing cost of service in such ratemaking. Because the ADIT account, the reserve account for deferred taxes, reduces rate base, it is clear that the portion of an NOLC that is attributable to accelerated depreciation must be taken into account in calculating the amount of the reserve for deferred taxes (ADIT). Thus, the proposed order by the Utility Law Judge upholding Taxpayer's position that the NOLC-related deferred tax account must be included in the calculation of Taxpayer's ADIT is in accord with the normalization requirements. The "last dollars deducted" methodology employed by Taxpayer is specifically designed to ensure that the portion of the NOLC attributable to accelerated depreciation is correctly taken into account by maximizing the amount of the NOLC attributable to accelerated depreciation. This methodology provides certainty and prevents the possibility of "flow through" of the benefits of accelerated depreciation to ratepayers. Under these facts, any method other than the "last dollars deducted" method would not provide the same level of certainty and therefore the use of any other methodology is inconsistent with the normalization rules.

Regarding the third issue, reduction of Taxpayer's tax expense element of cost of service, we believe that such reduction would, in effect, flow through the tax benefits of accelerated depreciation deductions through to rate payers even though the Taxpayer has not yet realized such benefits. In addition, such adjustment would be made specifically to mitigate the effect of the normalization rules in the calculation of Taxpayer's NOLC-related ADIT. In general, taxpayers may not adopt any accounting treatment that directly or indirectly circumvents the normalization rules. See generally, § 1.46-6(b)(2)(ii) (In determining whether, or to what extent, the investment tax credit has been used to reduce cost of service, reference shall be made to any accounting treatment that affects cost of service); Rev. Proc 88-12, 1988-1 C.B. 637, 638 (It is a violation of the normalization rules for taxpayers to adopt any accounting treatment that, directly or indirectly flows excess tax reserves to ratepayers prior to the time that the amounts in the vintage accounts reverse). This "offsetting reduction" would violate the normalization provisions.

Based on the representations submitted by Taxpayer, we rule as follows:

1. Under the circumstances described above, the reduction of Taxpayer's rate base by the balance of its ADIT accounts unreduced by its NOLC-related deferred tax account would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1 of the Income Tax regulations.
2. Under the circumstances described above, the reduction of Taxpayer's rate base by the full amount of its ADIT account balances offset by a portion of its NOLC-related account balance that is less than the amount attributable to accelerated depreciation computed on a "last dollars deducted" basis would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1.
3. Under the circumstances described above, any reduction in Taxpayer's tax expense element of cost of service to reflect the tax benefit of its NOLC would be inconsistent with the requirements of § 168(i)(9) and § 1.167(l)-1.

Except as specifically determined above, no opinion is expressed or implied concerning the Federal income tax consequences of the matters described above.

This ruling is directed only to the taxpayer who requested it. Section 6110(k)(3) of the Code provides it may not be used or cited as precedent. In accordance with the power of attorney on file with this office, a copy of this letter is being sent to your authorized representative. We are also sending a copy of this letter ruling to the Director.

Sincerely,

Peter C. Friedman
Senior Technician Reviewer, Branch 6
Office of Associate Chief Counsel
(Passthroughs & Special Industries)

cc:

Federal Tax Regulations, Regulation, §1.167(l)-1, Internal Revenue Service, Limitations on reasonable allowance in case of property of certain public utilities

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Reg. § 1.167(l)-1 does not reflect P.L. 101–508; Reg. § 1.167(l)-1(d) does not reflect P.L. 97-34.

(a) ***In general***

(1) ***Scope.—*** Section 167(l) in general provides limitations on the use of certain methods of computing a reasonable allowance for depreciation under section 167(a) with respect to "public utility property" (see paragraph (b) of this section) for all taxable years for which a Federal income tax return was not filed before August 1, 1969. The limitations are set forth in paragraph (c) of this section for "pre-1970 public utility property" and in paragraph (d) of this section for "post-1969 public utility property." Under section 167(l), a taxpayer may always use a straight line method (or other "subsection (l) method" as defined in paragraph (f) of this section). In general, the use of a method of depreciation other than a subsection (l) method is not prohibited by section 167(l) for any taxpayer if the taxpayer uses a "normalization method of regulated accounting" (described in paragraph (h) of this section). In certain cases, the use of a method of depreciation other than a subsection (l) method is not prohibited by section 167(l) if the taxpayer used a "flow-through method of regulated accounting" (described in paragraph (i) of this section) for its "July 1969 regulated accounting period" (described in paragraph (g) of this section) whether or not the taxpayer uses either a normalization or a flow-through method of regulated accounting after its July 1969 regulated accounting period. However, in no event may a method of depreciation other than a subsection (l) method be used in the case of pre-1970 public utility property unless such method of depreciation is the "applicable 1968 method" (within the meaning of paragraph (e) of this section). The normalization requirements of section 167(l) with respect to public utility property defined in section 167(l)(3)(A) pertain only to the deferral of Federal income tax liability resulting from the use of an accelerated method of depreciation for computing the allowance for depreciation under section 167 and the use of straight line depreciation for computing tax expense and depreciation expense for purposes of establishing cost of services and for reflecting operating results in regulated books of account. Regulations under section 167(l) do not pertain to other book-tax timing differences with respect to State income taxes, F.I.C.A. taxes, construction costs, or any other taxes and items. The rules provided in paragraph (h)(6) of this section are to insure that the same time period is used to determine the deferred tax reserve amount resulting from the use of an accelerated method of depreciation for cost of service purposes and the reserve amount that may be excluded from the rate base or included in no-cost capital in determining such cost of services. The formula provided in paragraph (h)(6)(ii) of this section is to be used in conjunction with the method of accounting for the reserve for deferred taxes (otherwise proper under paragraph (h)(2) of this section) in accordance with the accounting requirements prescribed or approved, if applicable, by the regulatory body having jurisdiction over the taxpayer's regulated books of account. The formula provides a method to determine the period of time during which the taxpayer will be treated as having received amounts credited or charged to the reserve account so that the disallowance of earnings with respect to such amounts through rate base exclusion or treatment as no-cost capital will take into account the factor of time for which such amounts are held by the taxpayer. The formula serves to limit the amount of such disallowance.

(2) ***Methods of depreciation.—*** For purposes of section 167(l), in the case of declining balance method each different uniform rate applied to the unrecovered cost or other basis of the property is a different method of depreciation. For purposes of section 167(l), a change in a uniform rate of depreciation due to a change in the useful life of the property or a change in the taxpayer's unrecovered cost or other basis for the property is not a change in the method of depreciation. The use of "guideline lives" or "class lives" for

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(iii) If subdivisions (i) and (ii) of this subparagraph do not apply, entries made to the satisfaction of the district director before January 1, 1970, in its regulated books of account for its most recent accounting period ending before August 1, 1969.

(2) ***July 1969 method of regulated accounting in certain acquisitions.—*** If public utility property is acquired in a transaction in which its basis in the hands of the transferee is determined in whole or in part by reference to its basis in the hands of the transferor by reason of the application of any provision of the Code, or in a transfer (including any purchase for cash or in exchange) from a related person, then in the hands of the transferee the method of regulated accounting for such property's July 1969 regulated accounting period shall be determined by reference to the treatment in respect of such property in the hands of the transferor. See paragraph (e)(4)(ii) of this section for definition of "related person."

(3) ***Determination date.—*** For purposes of section 167(l), any reference to a method of depreciation under section 167(a), or a method of regulated accounting, taken into account by the taxpayer in computing its tax expense for its July 1969 regulated accounting period shall be a reference to such tax expense as shown on the periodic report or report to shareholders to which subparagraph (l)(i) or (ii) of this paragraph applies or the entries made on the taxpayer's regulated books of account to which subparagraph (l)(iii) of this paragraph applies. Thus, for example, assume that regulatory body A having jurisdiction over public utility property with respect to X's regulated books of account requires X to reflect its tax expense in such books using the same method of depreciation which regulatory body B uses for determining X's cost of service for ratemaking purposes. If in 1971, in the course of approving a rate change for X, B retroactively determines X's cost of service for ratemaking purposes for X's July 1969 regulated accounting period using a method of depreciation different from the method reflected in X's regulated books of account as of January 1, 1970, the method of depreciation used by X for its July 1969 regulated accounting period would be determined without reference to the method retroactively used by B in 1971.

(h) ***Normalization method of accounting***

(1) ***In general***

(i) Under section 167(l), a taxpayer uses a normalization method of regulated accounting with respect to public utility property—

(a) If the same method of depreciation (whether or not a subsection (l) method) is used to compute both its tax expense and its depreciation expense for purposes of establishing cost of service for ratemaking purposes and for reflecting operating results in its regulated books of account, and

(b) If to compute its allowance for depreciation under section 167 it uses a method of depreciation other than the method it used for purposes described in (*a*) of this subdivision, the taxpayer makes adjustments consistent with subparagraph (2) of this paragraph to a reserve to reflect the total amount of the deferral of Federal income tax liability resulting from the use with respect to all of its public utility property of such different methods of depreciation.

(ii) In the case of a taxpayer described in section 167(l) (1)(B) or (2)(C), the reference in subdivision (i) of this subparagraph shall be a reference only to such taxpayer's "qualified public utility property." See § 1.167(l)-2(b) for definition of "qualified public utility property."

(iii) Except as provided in this subparagraph, the amount of Federal income tax liability deferred as a result of the use of different method of depreciation under subdivision (i) of this subparagraph is the excess (computed without regard to credits) of the amount the tax liability would have been had a subsection (l) method been used over the amount of the actual tax liability. Such amount shall be taken into account for the taxable year in which such different methods of depreciation are used. If, however,

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in respect of any taxable year the use of a method of depreciation other than a subsection (l) method for purposes of determining the taxpayer's reasonable allowance under section 167(a) results in a net operating loss carryover (as determined under section 172) to a year succeeding such taxable year which would not have arisen (or an increase in such carryover which would not have arisen) had the taxpayer determined his reasonable allowance under section 167(a) using a subsection (l) method, then the amount and time of the deferral of tax liability shall be taken into account in such appropriate time and manner as is satisfactory to the district director.

(2) ***Adjustments to reserve***

(i) The taxpayer must credit the amount of deferred Federal income tax determined under subparagraph (l)(i) of this paragraph for any taxable year to a reserve for deferred taxes, a depreciation reserve, or other reserve account. The taxpayer need not establish a separate reserve account for such amount but the amount of deferred tax determined under subparagraph (l)(i) of this paragraph must be accounted for in such a manner so as to be readily identifiable. With respect to any account, the aggregate amount allocable to deferred tax under section 167(l) shall not be reduced except to reflect the amount for any taxable year by which Federal income taxes are greater by reason of the prior use of different methods of depreciation under subparagraph (l)(i) of this paragraph. An additional exception is that the aggregate amount allocable to deferred tax under section 167(l) may be properly adjusted to reflect asset retirements or the expiration of the period for depreciation used in determining the allowance for depreciation under section 167(a).

(ii) The provisions of this subparagraph may be illustrated by the following examples:

Example (1). Corporation X is exclusively engaged in the transportation of gas by pipeline subject to the jurisdiction of the Federal Power Commission. With respect to its post-1969 public utility property, X is entitled under section 167(l)(2)(B) to use a method of depreciation other than a subsection (l) method if it uses a normalization method of regulated accounting. With respect to such property, X has not made any election under § 1.167(a)-11 (relating to depreciation based on class lives and asset depreciation ranges). In 1972, X places in service public utility property with an unadjusted basis of $2 million, and an estimated useful life of 20 years. X uses the declining-balance method of depreciation with a rate twice the straight line rate. If X uses a normalization method of regulated accounting, the amount of depreciation allowable under section 167(a) with respect to such property for 1972 computed under the double declining balance method would be $200,000. X computes its tax expense and depreciation expense for purposes of determining its cost of service for ratemaking purposes and for reflecting operating results in its regulated books of account using the straight line method of depreciation (a subsection (l) method). A depreciation allowance computed in this manner is $100,000. The excess of the depreciation allowance determined under the double declining balance method ($200,000) over the depreciation expense computed using the straight line method ($100,000) is $100,000. Thus, assuming a tax rate of 48 percent, X used a normalization method of regulated accounting for 1972 with respect to property placed in service that year if for 1972 it added to a reserve $48,000 as taxes deferred as a result of the use by X of a method of depreciation for Federal income tax purposes different from that used for establishing its cost of service for ratemaking purposes and for reflecting operating results in its regulated books of account.

Example (2). Assume the same facts as in example (l), except that X elects to apply § 1.167(a)-11 with respect to all eligible property placed in service in 1972. Assume further that all property X placed in service in 1972 is eligible property. One hundred percent of the asset guideline period for such property is 22 years and the asset depreciation range is from 17.5 years to 26.5 years. X uses the double declining balance method of depreciation, selects an asset depreciation period of 17.5 years, and applies the half-year convention (described in § 1.167(a)-11(c)(2)(iii)). In 1972, the depreciation allowable under section 167(a) with respect to property placed in service in 1972 is $114,285 (determined without regard to the normalization requirements in § 1.167(a)-11(b)(6) and

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**COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
REQUEST FOR INFORMATION
DATED JULY 8, 2016**

22. Refer to the Gas Stored Underground on Schedule B-5.1 Sheet 2 of 2.

a. Provide a schedule showing a history of the monthly injections and withdrawals and month end balances in mcf and/or dth and dollars for January 2012 through December 2017. In addition, provide the month end inventory costs in dollars per mcf and/or dth.

b. Provide the monthly and annual customer volumes, excluding transportation, for January 2012 through December 2017 and calendar years 2012 through 2017, respectively.

c. Explain why the Gas Stored Underground included in rate base in the test year is reasonable compared to the test year volumes, excluding transportation. Cite and provide a copy of all analyses and other documents relied on for your response.

Response:

a. Please see AG 1-22 Attachment A.

b. Please see AG 1-22 Attachment B.

Columbia Gas of Kentucky - Sales Volume
MCF per billing month

			Monthly	Annual
Actual	2012	1	1,682,275	
	2012	2	1,606,205	
	2012	3	1,148,911	
	2012	4	474,258	
	2012	5	369,090	
	2012	6	212,905	
	2012	7	190,630	
	2012	8	180,255	
	2012	9	195,094	
	2012	10	303,333	
	2012	11	754,411	
	2012	12	1,229,116	8,346,483
	2013	1	1,896,336	
	2013	2	1,921,219	
	2013	3	1,703,973	
	2013	4	1,239,472	
	2013	5	449,717	
	2013	6	263,633	
	2013	7	208,574	
	2013	8	191,957	
	2013	9	197,511	
	2013	10	238,577	
	2013	11	716,822	
	2013	12	1,613,849	10,641,640
	2014	1	2,251,085	
	2014	2	2,464,208	
	2014	3	1,835,618	
	2014	4	995,425	
	2014	5	382,220	
	2014	6	224,559	
	2014	7	172,347	
	2014	8	172,161	
	2014	9	183,279	
	2014	10	257,445	

	2014	11	752,287	
	2014	12	1,630,848	11,321,482
	2015	1	2,053,919	
	2015	2	2,152,357	
	2015	3	2,084,902	
	2015	4	831,555	
	2015	5	380,382	
	2015	6	223,315	
	2015	7	191,219	
	2015	8	185,335	
	2015	9	198,292	
	2015	10	242,246	
	2015	11	515,895	
	2015	12	1,047,622	10,107,039
	2016	1	1,639,003	
	2016	2	1,956,618	
Forecast	2016	3	1,457,402	
	2016	4	866,203	
	2016	5	393,918	
	2016	6	217,991	
	2016	7	158,998	
	2016	8	154,007	
	2016	9	152,000	
	2016	10	233,000	
	2016	11	598,000	
	2016	12	1,356,000	9,183,140
	2017	1	2,030,376	
	2017	2	1,981,911	
	2017	3	1,458,308	
	2017	4	860,971	
	2017	5	423,732	
	2017	6	232,715	
	2017	7	173,761	
	2017	8	167,756	
	2017	9	169,764	
	2017	10	250,736	
	2017	11	612,075	
	2017	12	1,363,092	9,725,195

c. There is not a direct relationship between storage balances and sales volumes. Therefore, it is not possible to view storage balances and sales volumes in isolation, and comment on the relationship between the two.

Columbia operates storage on a contract year basis (April through March) where gas is generally injected into storage in the summer and withdrawn in the winter. Such operation enables Columbia to meet the highly temperature-sensitive demand of sales customers during the high demand winter season (November through March). Additionally, storage also enables Columbia to offer an average day Customer CHOICE program and provides the mechanism to balance the difference between CHOICE supplier deliveries and their customer consumption on both a daily and seasonal basis. Lastly, Columbia fills its storage capacity based on the projected needs of its customers under a design winter, whereas projected sales is based on a normal winter. Therefore there is no correlation between storage quantities in any given month as compared to sales.

COLUMBIA GAS OF KENTUCKY, INC.
Calcluation of Gas Storage Balances

Line No.	Month	Per Books (LIFO Method) Account 164 Firm Stor Serv $ (1)	Injection (Mcf) (2)	Activity $ (3)	Withdraw (Mcf) (4)	Activity $ (5)	Ending Balance (Mcf) (6)	Ending Balance $ (7)	Annual WACOG Rate/Mcf ($/Mcf) (8)
1	Dec-11	47,816,450	40,509	0	1,297,066	0	8,850,141	47,816,450	
2	Jan-12	39,636,725	8,729	33,729	2,125,635	8,213,454	6,733,235	39,636,725	3.8640
3	YTD adj		8,729		2,125,635			872,165	(0.4120)
4	Feb-12	32,512,795	(2,370)	(8,181)	2,313,996	7,987,914	4,416,869	32,512,795	3.4520
5	YTD adj		6,359		4,439,631			(106,399)	0.0240
6	Mar-12	29,690,334	26,906	93,525	808,282	2,809,588	3,635,493	29,690,334	3.4760
7	YTD adj		33,265		5,247,913			1,621,756	(0.3110)
8	Apr-12	34,154,459	1,452,449	4,597,001	554,386	1,754,632	4,533,556	34,154,459	3.1650
9	YTD adj		1,485,714		5,802,299			43,166	(0.0100)
10	May-12	36,715,605	276,504	872,370	(521,588)	(1,645,610)	5,331,648	36,715,605	3.1550
11	YTD adj		1,762,218		5,280,711			(144,258)	0.0410
12	Jun-12	39,696,648	1,017,683	3,252,515	39,804	127,214	6,309,527	39,696,648	3.1960
13	YTD adj		2,779,901		5,320,515			(442,067)	0.1740
14	Jul-12	43,164,654	1,160,259	3,910,073	0	0	7,469,786	43,164,654	3.3700
15	YTD adj		3,940,160		5,320,515			(212,575)	0.1540
16	Aug-12	48,593,598	1,600,885	5,641,519	0	0	9,070,671	48,593,598	3.5240
17	YTD adj		5,541,045		5,320,515			10,585	0.0480
18	Sep-12	52,417,340	1,068,425	3,816,414	912	3,258	10,138,184	52,417,340	3.5720
19	YTD adj		6,609,470		5,321,427			60,538	0.0470
20	Oct-12	53,408,732	384,853	1,392,783	127,640	461,929	10,395,397	53,408,732	3.6190
21	YTD adj		6,994,323		5,449,067			(4,636)	(0.0030)
22	Nov-12	50,636,811	8,772	31,720	774,061	2,799,005	9,630,108	50,636,811	3.6160
23	YTD adj		7,003,095		6,223,128			(1,653,739)	0.0040
24	Dec-12	43,375,952	(16,332)	(59,122)	1,532,596	5,547,998	8,081,180	43,375,952	3.6200
25	LIFO adj for Net Gas Withdrawn	44,113,564	6,986,763		7,755,724		8,081,190	44,113,564	
26	Jan-13	32,012,692	104,536	434,452	3,016,199	12,535,323	5,169,527	32,012,692	4.1560
27	YTD adj		104,536		3,016,199			512,453	(0.1760)
28	Feb-13	24,256,703	14,005	55,740	2,091,503	8,324,182	3,092,029	24,256,703	3.9800
29	YTD adj		118,541		5,107,702			(344,252)	0.0690
30	Mar-13	15,963,551	118,547	479,997	2,081,723	8,428,896	1,128,853	15,963,551	4.0490
31	YTD adj		237,088		7,189,425			(2,989,505)	0.4300
32	Apr-13	15,475,944	875,712	3,922,314	317,128	1,420,416	1,687,437	15,475,944	4.4790
33	YTD adj		1,112,800		7,506,553			(1,323,507)	0.2070
34	May-13	23,284,200	1,952,912	9,151,346	4,179	19,583	3,636,170	23,284,200	4.6860
35	YTD adj		3,065,712		7,510,732			244,476	(0.0550)
36	Jun-13	32,060,807	1,842,984	8,534,859	589	2,728	5,478,565	32,060,807	4.6310
37	YTD adj		4,908,696		7,511,321			210,813	(0.0810)
38	Jul-13	41,006,055	1,919,067	8,731,755	(589)	(2,680)	7,398,221	41,006,055	4.5500
39	YTD adj		6,827,763		7,510,732			308,702	(0.4520)
40	Aug-13	47,535,402	1,520,618	6,231,493	2,647	10,847	8,916,192	47,535,402	4.0980
41	YTD adj		8,348,381		7,513,379			50,935	0.0610
42	Sep-13	53,224,256	1,357,370	5,645,302	1,775	7,382	10,271,787	53,224,256	4.1590
43	YTD adj		9,705,751		7,515,154			(4,381)	(0.0020)
44	Oct-13	54,602,419	456,865	1,899,188	124,283	516,644	10,604,369	54,602,419	4.1570
45	YTD adj		10,162,616		7,639,437			(75,695)	(0.0300)
46	Nov-13	52,123,315	99,042	408,746	681,404	2,812,154	10,022,007	52,123,315	4.1270
47	YTD adj		10,261,658		8,320,841			(1,639,392)	0.0090
48	Dec-13	40,863,335	29,824	123,352	2,355,885	9,743,940	7,695,946	40,863,335	4.1360
49	LIFO adj for Net Gas Withdrawn	42,258,421	10,291,482		10,676,726		7,695,946	42,258,421	
50	Jan-14	30,052,594	91,026	409,435	2,804,638	12,615,262	4,982,334	30,052,594	4.4980
51	YTD adj		91,026		2,804,638			(1,465,350)	0.5400
52	Feb-14	19,367,054	135,763	683,974	1,965,892	9,904,164	3,152,205	19,367,054	5.0380
53	YTD adj		226,789		4,770,530			(45,437)	0.0100
54	Mar-14	14,305,177	280,015	1,413,516	1,273,763	6,429,956	2,158,457	14,305,177	5.0480
55	YTD adj		506,804		6,044,293			747,561	(0.1350)
56	Apr-14	17,863,111	745,362	3,661,964	173,334	851,590	2,730,485	17,863,111	4.9130
57	YTD adj		1,252,166		6,217,627			(1,569,086)	0.3160
58	May-14	27,315,769	2,083,881	10,896,614	(23,930)	(125,130)	4,838,296	27,315,769	5.2290
59	YTD adj		3,336,047		6,193,697			308,626	(0.1080)
60	Jun-14	35,821,083	1,601,050	8,198,977	447	2,289	6,438,899	35,821,083	5.1210
61	YTD adj		4,937,097		6,194,144			(20,113)	0.0160
62	Jul-14	44,293,099	1,657,645	8,515,322	4,515	23,194	8,092,029	44,293,099	5.1370
63	YTD adj		6,594,742		6,198,659			27,330	0.0690
64	Aug-14	47,456,357	598,953	3,118,149	(3,415)	(17,778)	8,694,397	47,456,357	5.2060
65	YTD adj		7,193,695		6,195,244			(14,977)	(0.0150)
66	Sep-14	54,470,871	1,378,845	7,157,584	24,676	128,093	10,048,566	54,470,871	5.1910
67	YTD adj		8,572,540		6,219,920			(103,515)	(0.0440)
68	Oct-14	57,751,025	684,711	3,524,208	27,305	140,539	10,705,972	57,751,025	5.1470
69	YTD adj		9,257,251		6,247,225			(192,642)	(0.0640)
70	Nov-14	55,580,222	149,212	758,445	538,384	2,736,606	10,316,800	55,580,222	5.0830
71	YTD adj		9,406,463		6,785,609			(1,662,101)	(0.0020)
72	Dec-14	49,781,603	118,978	604,527	933,093	4,741,046	9,502,685	49,781,603	5.0810
73	LIFO adj for Net Gas Withdrawn	50,985,597	9,525,441		7,718,702		9,502,685	50,985,597	

COLUMBIA GAS OF KENTUCKY, INC.
Calcluation of Gas Storage Balances

Line No.	Month	Per Books (LIFO Method) Account 164 Firm Stor Serv $ (1)	Injection (Mcf) (2)	Activity $ (3)	Withdraw (Mcf) (4)	Activity $ (5)	Ending Balance (Mcf) (6)	Ending Balance $ (7)	Annual WACOG Rate/Mcf ($/Mcf) (8)
74	Jan-15	38,512,093	119,748	447,618	3,456,694	12,921,122	6,165,739	38,512,093	3.7380
75	YTD adj		119,748		3,456,694			2,586,133	(0.7750)
76	Feb-15	35,265,845	37,324	110,591	2,005,728	5,942,972	4,197,335	35,265,845	2.9630
77	YTD adj		157,072		5,462,422			(270,573)	0.0510
78	Mar-15	30,561,305	76,878	231,710	1,548,002	4,665,678	2,726,211	30,561,305	3.0140
79	YTD adj		233,950		7,010,424			(47,435)	0.0070
80	Apr-15	34,074,405	1,234,818	3,730,385	56,223	169,850	3,904,806	34,074,405	3.0210
81	YTD adj		1,468,768		7,066,647			(425,439)	0.0760
82	May-15	39,571,601	1,912,611	5,923,356	233	722	5,817,184	39,571,601	3.0970
83	YTD adj		3,381,379		7,066,880			(62,654)	0.0170
84	Jun-15	41,286,403	646,635	2,013,621	75,840	236,166	6,387,979	41,286,403	3.1140
85	YTD adj		4,028,014		7,142,720			(90,326)	0.0290
86	Jul-15	45,130,430	1,391,062	4,372,108	139,279	437,754	7,639,762	45,130,430	3.1430
87	YTD adj		5,419,076		7,281,999			1,863	(0.0010)
88	Aug-15	49,793,981	1,483,836	4,662,213	167	525	9,123,431	49,793,981	3.1420
89	YTD adj		6,902,912		7,282,166			(23,514)	0.0620
90	Sep-15	53,448,849	1,137,183	3,643,534	(10,876)	(34,847)	10,271,490	53,448,849	3.2040
91	YTD adj		8,040,095		7,271,290			(93,025)	(0.1210)
92	Oct-15	54,141,911	500,161	1,541,996	245,186	755,908	10,526,465	54,141,911	3.0830
93	YTD adj		8,540,256		7,516,476			(45,046)	(0.0440)
94	Nov-15	52,375,824	162,531	493,932	728,849	2,214,972	9,960,147	52,375,824	3.0390
95	YTD adj		8,702,787		8,245,325			(1,632,613)	0.0530
96	Dec-15	46,381,602	34,056	105,301	1,444,667	4,466,910	8,549,536	46,381,602	3.0920
97	LIFO adj for Net Gas Withdrawn	46,381,602	8,736,843		9,689,992		8,549,536	46,381,602	
98	Jan-16	38,950,208	155,459	406,681	2,996,206	7,838,075	5,708,789	38,950,208	2.6160
99	YTD adj		155,459		2,996,206			355,093	(0.1250)
100	Feb-16	34,495,823	29,609	73,756	1,960,351	4,883,234	3,778,047	34,495,823	2.4910
101	YTD adj		185,068		4,956,557			1,603,220	(0.3360)
102	Mar-16	33,960,111	115,866	249,691	1,108,410	2,388,624	2,785,503	33,960,111	2.1550
103	YTD adj		300,934		6,064,967			(1,250,795)	0.2170
104	Apr-16	33,979,548	869,989	2,063,614	334,478	793,382	3,321,014	33,979,548	2.3720
105	YTD adj		1,170,923		6,399,445			(1,077,076)	0.2060
106	May-16	36,229,203	1,588,083	4,094,078	297,652	767,347	4,611,445	36,229,203	2.5780
107	YTD adj		2,759,006		6,697,097			23,629	(0.0060)
108	Jun-16	39,933,333	1,557,510	4,005,916	126,522	325,415	6,042,433	39,933,333	2.5720
109	YTD adj		4,316,516		6,823,619			(110,313)	0.0440
110	Jul-16	43,677,827	1,473,550	3,854,807	0	0	7,515,983	43,677,827	2.6160
111	YTD adj		5,790,066		6,823,619			0	0.0000
112	Aug-16	47,532,634	1,473,550	3,854,807	0	0	8,989,533	47,532,634	2.6160
113	Sep-16	50,764,833	1,235,550	3,232,199	0	0	10,225,083	50,764,833	2.6160
114	Oct-16	51,732,753	370,000	967,920	0	0	10,595,083	51,732,753	2.6160
115	Nov-16	48,873,465	0	0	1,093,000	2,859,288	9,502,083	48,873,465	2.6160
116	Dec-16	44,635,545	0	0	1,620,000	4,237,920	7,882,083	44,635,545	2.6160
117	LIFO adj for Net Gas Withdrawn	43,157,604	8,869,166		9,536,619		7,882,083	43,157,604	
118	Jan-17	37,051,599	17,000	49,079	2,132,000	6,155,084	5,767,083	37,051,599	2.8870
119	Feb-17	32,406,416	0	0	1,609,000	4,645,183	4,158,083	32,406,416	2.8870
120	Mar-17	28,581,141	2,000	5,774	1,327,000	3,831,049	2,833,083	28,581,141	2.8870
121	Apr-17	30,908,063	806,000	2,326,922	0	0	3,639,083	30,908,063	2.8870
122	May-17	34,743,153	1,328,400	3,835,091	0	0	4,967,483	34,743,153	2.8870
123	Jun-17	38,578,244	1,328,400	3,835,091	0	0	6,295,883	38,578,244	2.8870
124	Jul-17	42,413,335	1,328,400	3,835,091	0	0	7,624,283	42,413,335	2.8870
125	Aug-17	46,248,426	1,328,400	3,835,091	0	0	8,952,683	46,248,426	2.8870
126	Sep-17	49,921,845	1,272,400	3,673,419	0	0	10,225,083	49,921,845	2.8870
127	Oct-17	50,990,035	370,000	1,068,190	0	0	10,595,083	50,990,035	2.8870
128	Nov-17	47,857,640	0	0	1,085,000	3,132,395	9,510,083	47,857,640	2.8870
129	Dec-17	43,186,474	0	0	1,618,000	4,671,166	7,892,083	43,186,474	2.8870
130	LIFO adj for Net Gas Withdrawn	43,186,474	7,781,000		7,771,000		7,892,083	43,186,474	

Columbia Gas of Kentucky - Sales Volume
MCF per billing month

			Monthly	Annual
Actual	2012	1	1,682,275	
	2012	2	1,606,205	
	2012	3	1,148,911	
	2012	4	474,258	
	2012	5	369,090	
	2012	6	212,905	
	2012	7	190,630	
	2012	8	180,255	
	2012	9	195,094	
	2012	10	303,333	
	2012	11	754,411	
	2012	12	1,229,116	8,346,483
	2013	1	1,896,336	
	2013	2	1,921,219	
	2013	3	1,703,973	
	2013	4	1,239,472	
	2013	5	449,717	
	2013	6	263,633	
	2013	7	208,574	
	2013	8	191,957	
	2013	9	197,511	
	2013	10	238,577	
	2013	11	716,822	
	2013	12	1,613,849	10,641,640
	2014	1	2,251,085	
	2014	2	2,464,208	
	2014	3	1,835,618	
	2014	4	995,425	
	2014	5	382,220	
	2014	6	224,559	
	2014	7	172,347	
	2014	8	172,161	
	2014	9	183,279	
	2014	10	257,445	
	2014	11	752,287	
	2014	12	1,630,848	11,321,482
	2015	1	2,053,919	
	2015	2	2,152,357	
	2015	3	2,084,902	
	2015	4	831,555	
	2015	5	380,382	
	2015	6	223,315	
	2015	7	191,219	
	2015	8	185,335	
	2015	9	198,292	
	2015	10	242,246	
	2015	11	515,895	
	2015	12	1,047,622	10,107,039

	Columbia Gas of Kentucky - Sales Volume MCF per billing month			
			Monthly	Annual
Forecast	2016	1	2,028,000	
	2016	2	1,974,000	
	2016	3	1,457,402	
	2016	4	866,203	
	2016	5	393,918	
	2016	6	217,991	
	2016	7	158,998	
	2016	8	154,007	
	2016	9	152,000	
	2016	10	233,000	
	2016	11	598,000	
	2016	12	1,356,000	9,589,519
	2017	1	2,030,376	
	2017	2	1,981,911	
	2017	3	1,458,308	
	2017	4	860,971	
	2017	5	423,732	
	2017	6	232,715	
	2017	7	173,761	
	2017	8	167,756	
	2017	9	169,764	
	2017	10	250,736	
	2017	11	612,075	
	2017	12	1,363,092	9,725,195

COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
REQUEST FOR INFORMATION
DATED JULY 8, 2016

23. Provide all of Mr. Moul's work papers and supporting documentation for his Direct Testimony and exhibits. Provide all spreadsheets with cell formulas intact.

Response:

Please refer to AG 1-23 Attachment A to this response for the supporting documentation for the Gas Group growth rates.

Also, please refer to Columbia's response to the KY PSC Staff Data Request PSC 2-44 for individual Microsoft Excel spreadsheets for each of the attachments that go with Mr. Moul's testimony.

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Analyst Estimates

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Earnings Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Avg. Estimate	1.39	0.58	3.27	3.50
No. of Analysts	8.00	7.00	11.00	11.00
Low Estimate	1.36	0.52	3.20	3.41
High Estimate	1.43	0.63	3.31	3.59
Year Ago EPS	1.36	0.54	3.10	3.27

Revenue Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Avg. Estimate	1.59B	701.04M	4.36B	4.56B
No. of Analysts	2	1	6	6
Low Estimate	1.55B	701.04M	3.84B	3.96B
High Estimate	1.64B	701.04M	5.36B	5.56B
Year Ago Sales	1.54B	686.40M	4.14B	4.36B
Sales Growth (year/est)	3.50%	2.10%	5.20%	4.60%

Earnings History	Mar 15	Jun 15	Sep 15	Dec 15
EPS Est	1.33	0.51	0.26	1.00
EPS Actual	1.36	0.54	0.29	0.93
Difference	0.03	0.03	0.03	-0.07
Surprise %	2.30%	5.90%	11.50%	-7.00%

EPS Trends	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Current Estimate	1.39	0.58	3.27	3.50
7 Days Ago	1.39	0.58	3.27	3.50
30 Days Ago	1.39	0.58	3.27	3.50
60 Days Ago	1.37	0.59	3.29	3.47
90 Days Ago	1.37	0.59	3.28	3.48

EPS Revisions	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Est	ATO	Industry	Sector	S&P 500
Current Qtr.	2.20%	-0.30%	13.10%	4.30%
Next Qtr.	7.40%	-35.70%	-61.70%	9.60%
This Year	5.50%	6.20%	20.30%	1.00%
Next Year	7.00%	13.90%	16.50%	12.70%
Past 5 Years (per annum)	16.89%	N/A	N/A	N/A
Next 5 Years (per annum)	6.40%	4.14%	4.83%	5.18%
Price/Earnings (avg. for comparison categories)	22.13	12.53	18.23	13.32
PEG Ratio (avg. for comparison categories)	3.46	2.09	10.13	1.91

Currency in USD.

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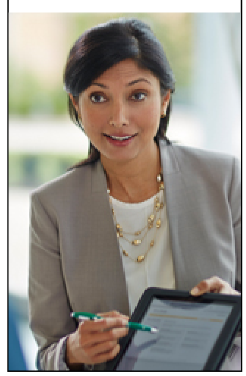

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Analyst Estimates

Get Analyst Estimates for: GO

Earnings Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Avg. Estimate	1.46	0.41	2.97	3.18
No. of Analysts	4.00	4.00	4.00	4.00
Low Estimate	1.35	0.34	2.85	3.00
High Estimate	1.64	0.56	3.15	3.40
Year Ago EPS	1.44	0.41	2.90	2.97

Revenue Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Avg. Estimate	169.20M	103.65M	499.30M	534.80M
No. of Analysts	2	2	2	2
Low Estimate	155.20M	101.00M	495.30M	529.90M
High Estimate	183.20M	106.30M	503.30M	539.70M
Year Ago Sales	170.08M	92.68M	459.24M	499.30M
Sales Growth (year/est)	-0.50%	11.80%	8.70%	7.10%

Earnings History	Mar 15	Jun 15	Sep 15	Dec 15
EPS Est	1.16	0.40	0.24	0.71
EPS Actual	1.44	0.41	0.33	0.73
Difference	0.28	0.01	0.09	0.02
Surprise %	24.10%	2.50%	37.50%	2.80%

EPS Trends	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Current Estimate	1.46	0.41	2.97	3.18
7 Days Ago	1.46	0.41	2.97	3.18
30 Days Ago	1.44	0.42	3.01	3.18
60 Days Ago	1.39	0.49	3.03	3.09
90 Days Ago	1.38	0.57	3.03	3.09

EPS Revisions	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Up Last 7 Days	0	0	0	0
Up Last 30 Days	1	0	0	1
Down Last 30 Days	0	0	0	0
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Est	CPK	Industry	Sector	S&P 500
Current Qtr.	1.40%	-0.30%	13.10%	4.30%
Next Qtr.	0.00%	-35.70%	-61.70%	9.60%
This Year	2.40%	6.20%	20.30%	1.00%
Next Year	7.10%	13.90%	16.50%	12.70%
Past 5 Years (per annum)	8.52%	N/A	N/A	N/A
Next 5 Years (per annum)	3.00%	4.14%	4.83%	5.18%
Price/Earnings (avg. for comparison categories)	20.79	12.53	18.23	13.32
PEG Ratio (avg. for comparison categories)	6.93	2.09	10.13	1.91

Currency in USD.

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The Laclede Group, Inc. (LG) - NYSE ★ **Watchlist** Like 6

67.11 ↑0.34(0.51%) 11:04AM EDT - NYSE Real Time Price

Analyst Estimates

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Earnings Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Avg. Estimate	2.29	0.31	3.37	3.52
No. of Analysts	8.00	8.00	9.00	9.00
Low Estimate	2.25	0.28	3.35	3.48
High Estimate	2.35	0.35	3.40	3.58
Year Ago EPS	2.25	0.25	3.19	3.37

Revenue Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Avg. Estimate	807.81M	295.95M	1.81B	1.84B
No. of Analysts	3	3	6	6
Low Estimate	605.07M	288.17M	1.51B	1.56B
High Estimate	916.37M	308.67M	2.01B	2.04B
Year Ago Sales	877.40M	275.20M	1.98B	1.81B
Sales Growth (year/est)	-7.90%	7.50%	-8.60%	2.00%

Earnings History	Mar 15	Jun 15	Sep 15	Dec 15
EPS Est	2.13	0.16	-0.35	1.11
EPS Actual	2.25	0.25	-0.37	1.04
Difference	0.12	0.09	-0.02	-0.07
Surprise %	5.60%	56.20%	-5.70%	-6.30%

EPS Trends	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Current Estimate	2.29	0.31	3.37	3.52
7 Days Ago	2.29	0.31	3.37	3.52
30 Days Ago	2.29	0.31	3.37	3.53
60 Days Ago	2.29	0.30	3.38	3.51
90 Days Ago	2.29	0.29	3.38	3.52

EPS Revisions	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Est	LG	Industry	Sector	S&P 500
Current Qtr.	1.80%	-0.30%	13.10%	4.30%
Next Qtr.	24.00%	-35.70%	-61.70%	9.60%
This Year	5.60%	6.20%	20.30%	1.00%
Next Year	4.50%	13.90%	16.50%	12.70%
Past 5 Years (per annum)	-3.56%	N/A	N/A	N/A
Next 5 Years (per annum)	4.70%	4.14%	4.83%	5.18%
Price/Earnings (avg. for comparison categories)	19.79	12.53	18.23	13.32
PEG Ratio (avg. for comparison categories)	4.21	2.09	10.13	1.91

Currency in USD.

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TODAY'S CHANGES

New Jersey Resources Corp. (NJR) - NYSE ★ Watchlist Like 6

36.12 ↑0.03(0.08%) 11:05AM EDT - NYSE Real Time Price

Analyst Estimates

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Earnings Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Avg. Estimate	0.88	0.17	1.64	1.78
No. of Analysts	5.00	5.00	7.00	8.00
Low Estimate	0.83	0.14	1.58	1.68
High Estimate	0.92	0.19	1.80	1.94
Year Ago EPS	1.16	0.03	1.76	1.64

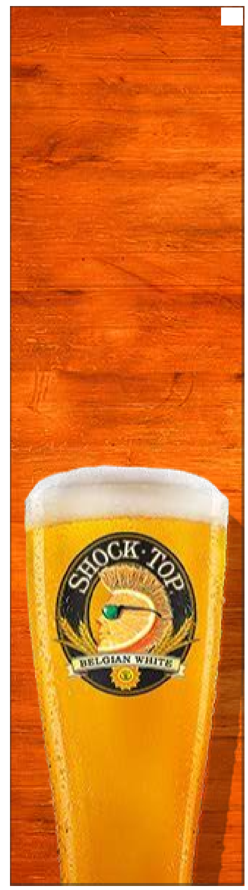
Revenue Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Avg. Estimate	1.09B	469.37M	2.70B	2.76B
No. of Analysts	1	1	3	5
Low Estimate	1.09B	469.37M	2.45B	2.20B
High Estimate	1.09B	469.37M	2.92B	3.20B
Year Ago Sales	1.01B	458.47M	2.73B	2.70B
Sales Growth (year/est)	8.00%	2.40%	-1.30%	2.10%

Earnings History	Mar 15	Jun 15	Sep 15	Dec 15
EPS Est	0.95	0.05	-0.08	0.56
EPS Actual	1.16	0.03	-0.06	0.57
Difference	0.21	-0.02	0.02	0.01
Surprise %	22.10%	-40.00%	25.00%	1.80%

EPS Trends	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Current Estimate	0.88	0.17	1.64	1.78
7 Days Ago	0.88	0.17	1.63	1.77
30 Days Ago	0.88	0.17	1.60	1.77
60 Days Ago	0.90	0.17	1.64	1.79
90 Days Ago	0.90	0.18	1.66	1.82

EPS Revisions	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Up Last 7 Days	0	0	1	0
Up Last 30 Days	0	0	1	0
Down Last 30 Days	0	0	0	0
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Est	NJR	Industry	Sector	S&P 500
Current Qtr.	-24.10%	-0.30%	13.10%	4.30%
Next Qtr.	466.70%	-35.70%	-61.70%	9.60%
This Year	-6.80%	6.20%	20.30%	1.00%
Next Year	8.50%	13.90%	16.50%	12.70%
Past 5 Years (per annum)	11.53%	N/A	N/A	N/A
Next 5 Years (per annum)	6.50%	4.14%	4.83%	5.18%
Price/Earnings (avg. for comparison categories)	21.86	12.53	18.23	13.32
PEG Ratio (avg. for comparison categories)	3.36	2.09	10.13	1.91



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Northwest Natural Gas Company (NWN) - NYSE ★ Watchlist

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53.13 ↑0.44 (0.84%) 11:04AM EDT - NYSE Real Time Price

Analyst Estimates

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Earnings Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Avg. Estimate	1.27	0.11	2.16	2.24
No. of Analysts	3.00	3.00	4.00	4.00
Low Estimate	1.12	0.10	2.12	2.12
High Estimate	1.35	0.12	2.20	2.35
Year Ago EPS	1.37	0.08	2.37	2.16

Revenue Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Avg. Estimate	273.05M	144.32M	777.02M	794.40M
No. of Analysts	1	1	1	1
Low Estimate	273.05M	144.32M	777.02M	794.40M
High Estimate	273.05M	144.32M	777.02M	794.40M
Year Ago Sales	261.66M	138.28M	723.79M	777.02M
Sales Growth (year/est)	4.40%	4.40%	7.40%	2.20%

Earnings History	Mar 15	Jun 15	Sep 15	Dec 15
EPS Est	1.51	0.06	-0.33	1.03
EPS Actual	1.37	0.08	-0.24	1.16
Difference	-0.14	0.02	0.09	0.13
Surprise %	-9.30%	33.30%	27.30%	12.60%

EPS Trends	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Current Estimate	1.27	0.11	2.16	2.24
7 Days Ago	1.27	0.11	2.16	2.24
30 Days Ago	1.29	0.13	2.28	2.36
60 Days Ago	1.28	0.14	2.32	2.48
90 Days Ago	1.15	0.18	2.32	2.48

EPS Revisions	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Est	NWN	Industry	Sector	S&P 500
Current Qtr.	-7.30%	-0.30%	13.10%	4.30%
Next Qtr.	37.50%	-35.70%	-61.70%	9.60%
This Year	-8.90%	6.20%	20.30%	1.00%
Next Year	3.70%	13.90%	16.50%	12.70%
Past 5 Years (per annum)	-10.09%	N/A	N/A	N/A
Next 5 Years (per annum)	4.00%	4.14%	4.83%	5.18%
Price/Earnings (avg. for comparison categories)	24.20	12.53	18.23	13.32
PEG Ratio (avg. for comparison categories)	6.05	2.09	10.13	1.91

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South Jersey Industries, Inc. (SJI) - NYSE ★ **Watchlist**

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27.93 ⬆0.11(0.40%) 11:05AM EDT - NYSE Real Time Price

Analyst Estimates

Get Analyst Estimates for: GO

Earnings Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Avg. Estimate	0.82	0.21	1.58	1.58
No. of Analysts	4.00	4.00	4.00	4.00
Low Estimate	0.80	0.10	1.57	1.41
High Estimate	0.85	0.29	1.60	1.74
Year Ago EPS	0.86	0.03	1.44	1.58

Revenue Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Avg. Estimate	405.00M	191.00M	1.03B	1.09B
No. of Analysts	1	1	1	1
Low Estimate	405.00M	191.00M	1.03B	1.09B
High Estimate	405.00M	191.00M	1.03B	1.09B
Year Ago Sales	NaN	177.71M	959.57M	1.03B
Sales Growth (year/est)	N/A	7.50%	7.10%	6.20%

Earnings History	Mar 15	Jun 15	Sep 15	Dec 15
EPS Est	0.88	0.12	0.11	0.67
EPS Actual	0.86	0.03	-0.07	0.62
Difference	-0.02	-0.09	-0.18	-0.05
Surprise %	-2.30%	-75.00%	-163.60%	-7.50%

EPS Trends	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Current Estimate	0.82	0.21	1.58	1.58
7 Days Ago	0.82	0.21	1.58	1.58
30 Days Ago	0.82	0.18	1.60	1.62
60 Days Ago	0.82	0.18	1.60	1.62
90 Days Ago	0.83	0.26	1.61	1.71

EPS Revisions	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	2
Down Last 30 Days	0	0	0	0
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Est	SJI	Industry	Sector	S&P 500
Current Qtr.	-4.70%	-0.30%	13.10%	4.30%
Next Qtr.	600.00%	-35.70%	-61.70%	9.60%
This Year	9.70%	6.20%	20.30%	1.00%
Next Year	0.00%	13.90%	16.50%	12.70%
Past 5 Years (per annum)	13.79%	N/A	N/A	N/A
Next 5 Years (per annum)	6.00%	4.14%	4.83%	5.18%
Price/Earnings (avg. for comparison categories)	17.56	12.53	18.23	13.32
PEG Ratio (avg. for comparison categories)	2.93	2.09	10.13	1.91

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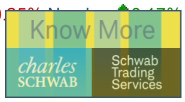

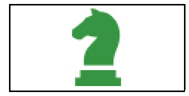

Southwest Gas Corporation (SWX) - NYSE ★ Watchlist

Like 7

65.94 ↑1.05(1.62%) 11:07AM EDT - NYSE Real Time Price

Analyst Estimates

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Earnings Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Avg. Estimate	1.62	0.18	3.19	3.41
No. of Analysts	5.00	5.00	7.00	7.00
Low Estimate	1.60	0.13	3.06	3.36
High Estimate	1.63	0.21	3.32	3.47
Year Ago EPS	1.53	0.10	2.97	3.19

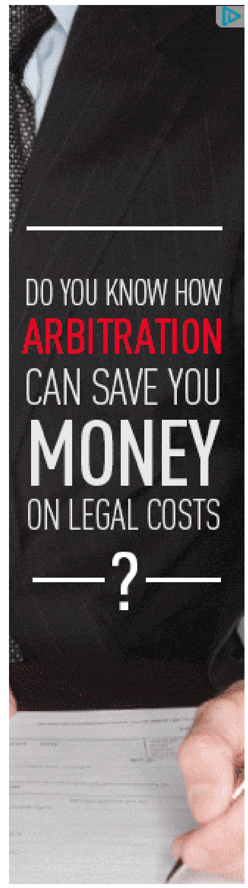
Revenue Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Avg. Estimate	756.17M	560.76M	2.55B	2.63B
No. of Analysts	2	2	2	2
Low Estimate	752.53M	554.42M	2.53B	2.60B
High Estimate	759.80M	567.10M	2.56B	2.67B
Year Ago Sales	734.22M	538.60M	2.46B	2.55B
Sales Growth (year/est)	3.00%	4.10%	3.30%	3.50%

Earnings History	Mar 15	Jun 15	Sep 15	Dec 15
EPS Est	1.60	0.21	0.05	1.34
EPS Actual	1.53	0.10	-0.03	1.38
Difference	-0.07	-0.11	-0.08	0.04
Surprise %	-4.40%	-52.40%	-160.00%	3.00%

EPS Trends	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Current Estimate	1.62	0.18	3.19	3.41
7 Days Ago	1.62	0.18	3.19	3.41
30 Days Ago	1.63	0.19	3.20	3.42
60 Days Ago	1.64	0.21	3.23	3.45
90 Days Ago	1.65	0.21	3.25	3.44

EPS Revisions	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Dec 16	Next Year Dec 17
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	1	1
Down Last 30 Days	0	0	0	0
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Est	SWX	Industry	Sector	S&P 500
Current Qtr.	5.90%	-0.30%	13.10%	4.30%
Next Qtr.	80.00%	-35.70%	-61.70%	9.60%
This Year	7.40%	6.20%	20.30%	1.00%
Next Year	6.90%	13.90%	16.50%	12.70%
Past 5 Years (per annum)	-5.93%	N/A	N/A	N/A
Next 5 Years (per annum)	4.00%	4.14%	4.83%	5.18%
Price/Earnings (avg. for comparison categories)	20.56	12.53	18.23	13.32
PEG Ratio (avg. for comparison categories)	5.14	2.09	10.13	1.91



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WGL Holdings Inc. (WGL) - NYSE Watchlist

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71.39 0.61(0.86%) 11:08AM EDT - NYSE Real Time Price

Analyst Estimates

Get Analyst Estimates for: GO

Earnings Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Avg. Estimate	1.96	0.13	3.14	3.29
No. of Analysts	5.00	5.00	6.00	6.00
Low Estimate	1.93	-0.17	3.10	3.18
High Estimate	2.00	0.25	3.18	3.40
Year Ago EPS	2.02	0.22	3.16	3.14

Revenue Est	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Avg. Estimate	1.07B	485.99M	2.67B	2.83B
No. of Analysts	2	2	4	4
Low Estimate	1.04B	460.20M	2.54B	2.71B
High Estimate	1.10B	511.78M	2.83B	3.01B
Year Ago Sales	1.00B	441.17M	2.66B	2.67B
Sales Growth (year/est)	6.90%	10.20%	0.40%	6.10%

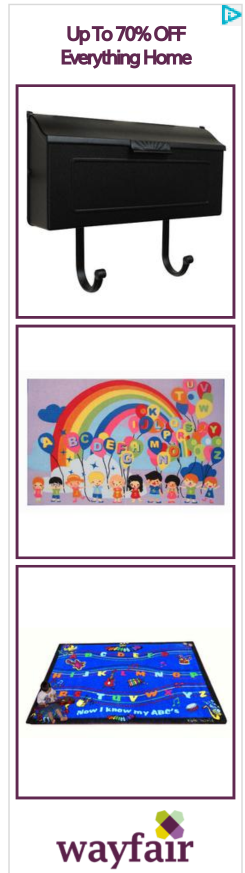
Earnings History	Mar 15	Jun 15	Sep 15	Dec 15
EPS Est	1.70	-0.09	-0.35	1.25
EPS Actual	2.02	0.22	-0.23	1.18
Difference	0.32	0.31	0.12	-0.07
Surprise %	18.80%	344.40%	34.30%	-5.60%

EPS Trends	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Current Estimate	1.96	0.13	3.14	3.29
7 Days Ago	1.96	0.13	3.14	3.29
30 Days Ago	1.97	0.11	3.17	3.27
60 Days Ago	1.88	0.08	3.08	3.23
90 Days Ago	1.81	0.12	3.08	3.29

EPS Revisions	Current Qtr. Mar 16	Next Qtr. Jun 16	Current Year Sep 16	Next Year Sep 17
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	1	1
Down Last 30 Days	0	0	0	0
Down Last 90 Days	N/A	N/A	N/A	N/A

Growth Est	WGL	Industry	Sector	S&P 500
Current Qtr.	-3.00%	-0.30%	13.10%	4.30%
Next Qtr.	-40.90%	-35.70%	-61.70%	9.60%
This Year	-0.60%	6.20%	20.30%	1.00%
Next Year	4.80%	13.90%	16.50%	12.70%
Past 5 Years (per annum)	-10.68%	N/A	N/A	N/A
Next 5 Years (per annum)	8.00%	4.14%	4.83%	5.18%
Price/Earnings (avg. for comparison categories)	22.46	12.53	18.23	13.32
PEG Ratio (avg. for comparison categories)	2.81	2.09	10.13	1.91

Currency in USD.



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Atmos Energy Cp: (ATO)

(Real Time Quote From BATS)

Add to portfolio

$73.51 USD

+0.94 (1.30%)

Updated Mar 29, 2016 12:44 PM ET

Volume:	213,972
Open:	$72.81
Prior Close:	$72.57

Zacks Rank :

Style Scores :

ZER Report :

Is ATO a Buy, Hold or Sell?
See its Zacks Rank in our free stock analysis report.
Get Free Report for ATO

Company Summary

Atmos Energy Corporation distributes and sells natural gas to residential, commercial, industrial, agricultural and other customers. Atmos operates through five divisions in cities, towns and communities in service areas located in Colorado, Georgia, Illinois, Iowa, Kansas, Kentucky, Louisiana, Missouri, South Carolina, Tennessee, Texas and Virginia. The Company has entered into an agreement to sell all of its natural gas utility operations in South Carolina. The Company also transports natural gas for others through its distribution system.

General Information

ATMOS ENERGY CP

1800 THREE LINCOLN CTR 5430 LBJ FREEWAY

DALLAS, TX 75240

Phone: 972-934-9227

Fax: 972-855-3040

Web: http://www.atmosenergy.com

Email: NA

Industry	UTIL-GAS DISTR
Sector	Utilities

Fiscal Year End	September
Last Reported Quarter	12/31/2015
Next EPS Date	5/4/2016

EPS Information

Current Quarter EPS Consensus Estimate	1.39
Current Year EPS Consensus Estimate	3.28
Estimated Long-Term EPS Growth Rate	6.60
Next EPS Report Date	5/4/2016

Trades from $3

Chart for ATO

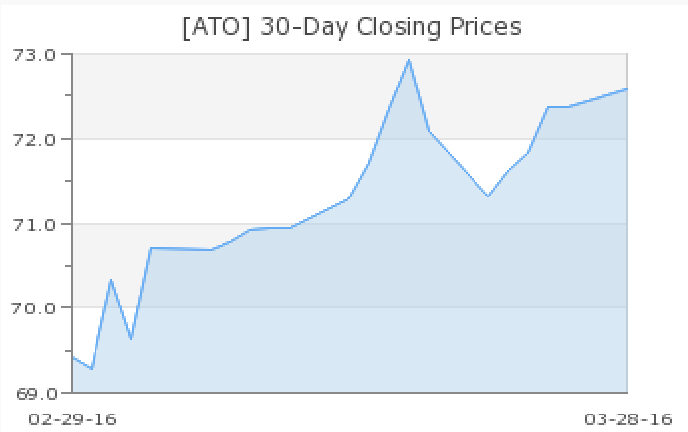
Interactive Chart | Fundamental Charts

Consensus Recommendations

Current (1=Strong Buy, 5=Strong Sell)	2.25
30 Days Ago	2.17
60 Days Ago	2.06
90 Days Ago	1.89

Price And Volume Information

Zacks Rank	
Yesterday's Close	72.57
52 Week High	73.68
52 Week Low	50.83
Beta	0.32
20 Day Moving Average	1,002,868.63
Target Price Consensus	69.42



% Price Change

4 Week	3.18
12 Week	14.82
YTD	14.82

% Price Change Relative to S&P 500

4 Week	-1.28
12 Week	15.27
YTD	15.27

Share Information

Shares Outstanding (millions)	102.05
Market Capitalization (millions)	7,386.45
Short Ratio	NA
Last Split Date	5/17/1994

Dividend Information

Dividend Yield	2.32%
Annual Dividend	$1.68
Payout Ratio	0.54
Change in Payout Ratio	-0.03
Last Dividend Payout / Amount	2/18/2016 / $0.42

Fundamental Ratios

P/E

P/E (F1)	22.08
Trailing 12 Months	23.20
PEG Ratio	3.35

EPS Growth

vs. Previous Year	2.20%
vs. Previous Quarter	220.69%

Sales Growth

vs. Previous Year	-27.22%
vs. Previous Quarter	NA%

Price Ratios

Price/Book	2.26
Price/Cash Flow	12.41
Price / Sales	NA

ROE

12/31/15	9.94
9/30/15	10.02
6/30/15	9.94

ROA

12/31/15	3.50
9/30/15	3.51
6/30/15	3.51

Current Ratio

12/31/15	0.57
9/30/15	0.55
6/30/15	0.67

Quick Ratio

12/31/15	0.41
9/30/15	0.34
6/30/15	0.44

Operating Margin

12/31/15	NA
9/30/15	NA
6/30/15	NA

Net Margin

12/31/15	NA
9/30/15	NA
6/30/15	NA

Pre-Tax Margin

12/31/15	75.61
9/30/15	12.33
6/30/15	75.28

Book Value

12/31/15	32.06
9/30/15	31.52
6/30/15	32.06

Inventory Turnover

Debt-to-Equity

12/31/15	12.73
9/30/15	13.80
6/30/15	13.73

12/31/15	0.75
9/30/15	0.77
6/30/15	0.76

Debt to Capital

12/31/15	42.87
9/30/15	43.46
6/30/15	43.12

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Chesapeake Util: (CPK)

(Real Time Quote From BATS)

Add to portfolio

$62.51 USD

+0.76 (1.23%)

Updated Mar 29, 2016 12:44 PM ET

Volume:	23,643
Open:	$61.52
Prior Close:	$61.75

Zacks Rank :

Style Scores :

ZER Report :

Is CPK a Buy, Hold or Sell?
See its Zacks Rank in our free stock analysis report.

Get Free Report for CPK

Company Summary

Chesapeake Utilities Corporation is a utility company engaged in natural gas distribution and transmission, propane distribution and marketing, advanced information services and other related businesses.Chesapeake's three natural gas distribution divisions serve residential, commercial and industrial customers in southern Delaware, Maryland's Eastern Shore and Florida. The Company's natural gas transmission subsidiary operates an interstate pipeline system that transports gas from various points in Pennsylvania to Delaware and Maryland distribution divisions.

General Information

CHESAPEAKE UTIL

909 SILVER LAKE BLVD PO BOX 615

DOVER, DE 19904

Phone: 302-734-6799

Fax: 302-734-6750

Web: http://www.chpk.com

Email: NA

Industry	UTIL-GAS DISTR
Sector	Utilities

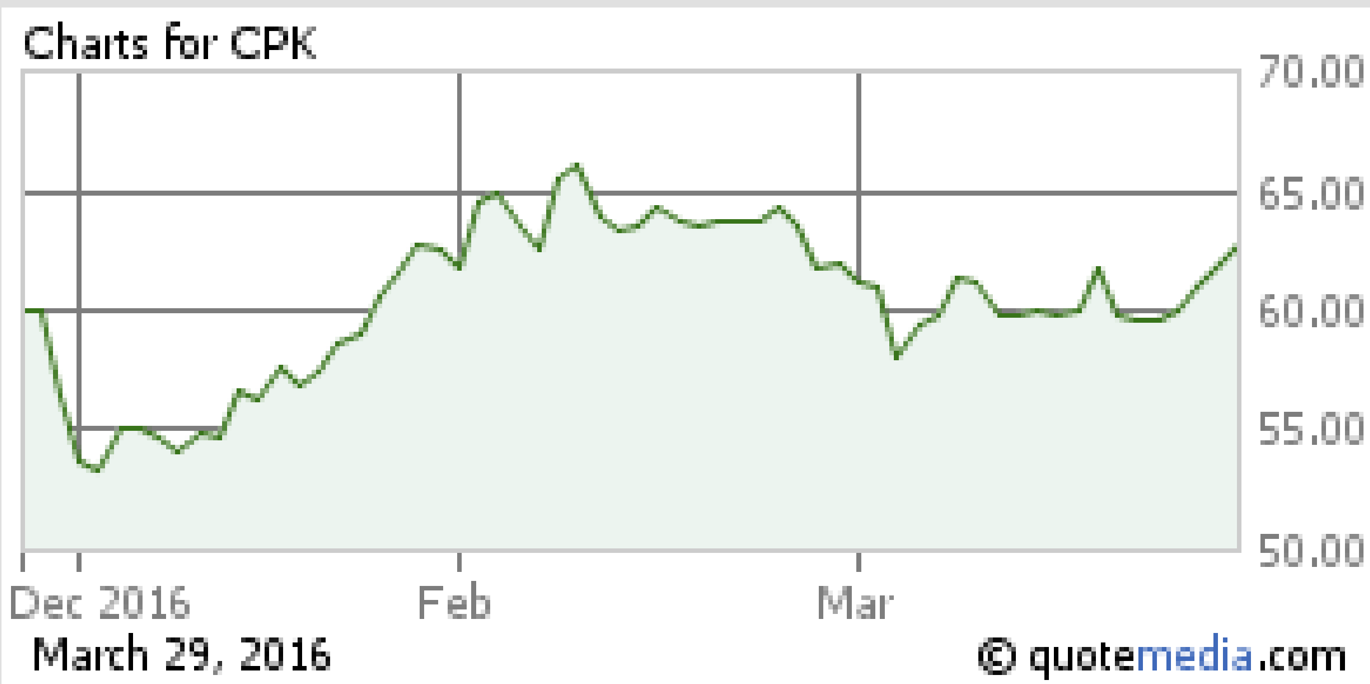
Fiscal Year End	December
Last Reported Quarter	12/31/2015
Next EPS Date	5/4/2016

EPS Information

Current Quarter EPS Consensus Estimate	1.40
Current Year EPS Consensus Estimate	2.97
Estimated Long-Term EPS Growth Rate	NA
Next EPS Report Date	5/4/2016

Trades from $3

Chart for CPK



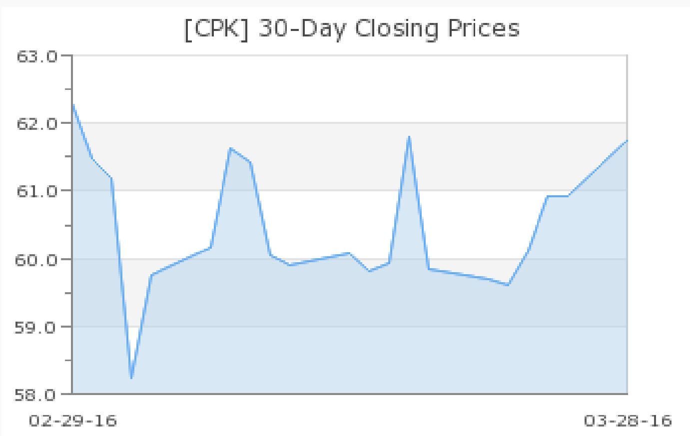
Interactive Chart | Fundamental Charts

Consensus Recommendations

Current (1=Strong Buy, 5=Strong Sell)	3.00
30 Days Ago	1.75
60 Days Ago	1.75
90 Days Ago	1.50

Price And Volume Information

Zacks Rank	
Yesterday's Close	61.75
52 Week High	67.36
52 Week Low	44.37
Beta	0.28
20 Day Moving Average	98,750.70
Target Price Consensus	59.50



% Price Change

4 Week	-1.85
12 Week	7.35
YTD	7.35

% Price Change Relative to S&P 500

4 Week	-6.09
12 Week	7.77
YTD	7.77

Share Information

Shares Outstanding (millions)	15.28
Market Capitalization (millions)	930.61
Short Ratio	NA
Last Split Date	9/9/2014

Dividend Information

Dividend Yield	1.89%
Annual Dividend	$1.15
Payout Ratio	0.40
Change in Payout Ratio	-0.06
Last Dividend Payout / Amount	3/11/2016 / $0.29

Fundamental Ratios

P/E

P/E (F1)	20.50
Trailing 12 Months	21.38
PEG Ratio	NA

EPS Growth

vs. Previous Year	7.35%
vs. Previous Quarter	121.21%

Sales Growth

vs. Previous Year	-13.14%
vs. Previous Quarter	13.77%

Price Ratios

Price/Book	2.60
Price/Cash Flow	11.41
Price / Sales	2.03

ROE

12/31/15	12.39
9/30/15	12.59
6/30/15	12.54

ROA

12/31/15	4.32
9/30/15	4.38
6/30/15	4.36

Current Ratio

12/31/15	0.40
9/30/15	0.37
6/30/15	0.39

Quick Ratio

12/31/15	0.37
9/30/15	0.33
6/30/15	0.35

Operating Margin

12/31/15	9.31
9/30/15	8.76
6/30/15	8.36

Net Margin

12/31/15	8.96
9/30/15	8.97
6/30/15	8.57

Pre-Tax Margin

12/31/15	14.82
9/30/15	14.93
6/30/15	14.26

Book Value

12/31/15	23.46
9/30/15	23.15
6/30/15	23.06

Inventory Turnover

Debt-to-Equity

12/31/15	37.52
9/30/15	38.58
6/30/15	37.03

12/31/15	0.42
9/30/15	0.44
6/30/15	0.44

Debt to Capital

12/31/15	29.43
9/30/15	30.62
6/30/15	30.79

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Laclede Grp Inc: (LG)

(Real Time Quote From BATS)

Add to portfolio

$67.53 USD

+0.76 (1.14%)

Updated Mar 29, 2016 12:44 PM ET

Volume:	53,281
Open:	$66.89
Prior Close:	$66.77

Zacks Rank :

Style Scores :

ZER Report :

Is LG a Buy, Hold or Sell?
See its Zacks Rank in our free stock analysis report.

Get Free Report for LG

Company Summary

The Laclede Group, Inc. is a public utility engaged in the retail distribution and transportation of natural gas. The Company, which is subject to the jurisdiction of the Missouri Public Service Commission, serves the City of St. Louis, St. Louis County, the City of St. Charles, St. Charles County, the town of Arnold, and parts of Franklin, Jefferson, St. Francois, Ste. Genevieve, Iron, Madison and Butler Counties, all in Missouri.

General Information

LACLEDE GRP INC

700 MARKET STREET

ST LOUIS, MO 63101

Phone: 314-342-0500

Fax: 314-421-1979

Web: http://www.thelacledegroup.com

Email: scott.dudley@thelacledegroup.com

Industry	UTIL-GAS DISTR
Sector	Utilities

Fiscal Year End	September
Last Reported Quarter	12/31/2015
Next EPS Date	5/4/2016

EPS Information

Current Quarter EPS Consensus Estimate	2.29
Current Year EPS Consensus Estimate	3.38
Estimated Long-Term EPS Growth Rate	4.80
Next EPS Report Date	5/4/2016

Trades from $3

Chart for LG

Interactive Chart | Fundamental Charts

Consensus Recommendations

Current (1=Strong Buy, 5=Strong Sell)	2.43
30 Days Ago	2.43
60 Days Ago	2.43
90 Days Ago	2.20

Price And Volume Information

Zacks Rank	
Yesterday's Close	66.77
52 Week High	67.43
52 Week Low	49.66
Beta	0.26
20 Day Moving Average	247,996.84
Target Price Consensus	64.17

% Price Change

4 Week	2.73
12 Week	12.25
YTD	12.25

% Price Change Relative to S&P 500

4 Week	-1.71
12 Week	12.69
YTD	12.69

Share Information

Shares Outstanding (millions)	43.44
Market Capitalization (millions)	2,897.35
Short Ratio	NA
Last Split Date	3/8/1994

Dividend Information

Dividend Yield	2.94%
Annual Dividend	$1.96
Payout Ratio	0.62
Change in Payout Ratio	0.03
Last Dividend Payout / Amount	3/9/2016 / $0.49

Fundamental Ratios

P/E

P/E (F1)	19.75
Trailing 12 Months	21.04
PEG Ratio	4.13

EPS Growth

vs. Previous Year	-1.89%
vs. Previous Quarter	381.08%

Sales Growth

vs. Previous Year	-35.54%
vs. Previous Quarter	95.59%

Price Ratios

Price/Book	1.81
Price/Cash Flow	10.74
Price / Sales	1.65

ROE

12/31/15	8.62
9/30/15	8.75
6/30/15	9.72

ROA

12/31/15	2.63
9/30/15	2.66
6/30/15	2.95

Current Ratio

12/31/15	0.75
9/30/15	0.62
6/30/15	0.67

Quick Ratio

12/31/15	0.51
9/30/15	0.37
6/30/15	0.44

Operating Margin

12/31/15	7.84
9/30/15	7.00
6/30/15	7.63

Net Margin

12/31/15	7.78
9/30/15	6.93
6/30/15	7.05

Pre-Tax Margin

12/31/15	11.33
9/30/15	10.07
6/30/15	10.12

Book Value

12/31/15	36.92
9/30/15	36.32
6/30/15	37.13

Inventory Turnover

Debt-to-Equity

12/31/15	4.78
9/30/15	5.62
6/30/15	5.64

12/31/15	1.16
9/30/15	1.13
6/30/15	1.08

Debt to Capital

12/31/15	53.64
9/30/15	52.96
6/30/15	51.91

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Nj Resources: (NJR)

(Real Time Quote From BATS)

Add to portfolio

$36.38 USD

+0.29 (0.80%)

Updated Mar 29, 2016 12:46 PM ET

Volume:	198,545
Open:	$36.06
Prior Close:	$36.09

Zacks Rank :

Style Scores :

ZER Report :

Is NJR a Buy, Hold or Sell?
See its Zacks Rank in our free stock analysis report.

Get Free Report for NJR

Company Summary

NJ RESOURCES is an exempt energy svcs holding company providing retail & wholesale natural gas & related energy services to customers from the Gulf Coast to New England. Subsidiaries include: (1) N J Natural Gas Co, a natural gas distribution company that provides regulated energy & appliance services to residential, commercial & industrial customers in central & northern N J. (2) NJR Energy Holdings Corp formerly NJR Energy Svcs Corp & (3) NJR Development Corp, a sub-holding company of NJR, which includes the Company's remaining unregulated operating subsidiaries.

General Information

NJ RESOURCES

1415 Wyckoff Road

WALL, NJ 07719

Phone: 732-938-1480

Fax: 732-938-3154

Web: http://www.njresources.com

Email: investcont@njresources.com

Industry	UTIL-GAS DISTR
Sector	Utilities

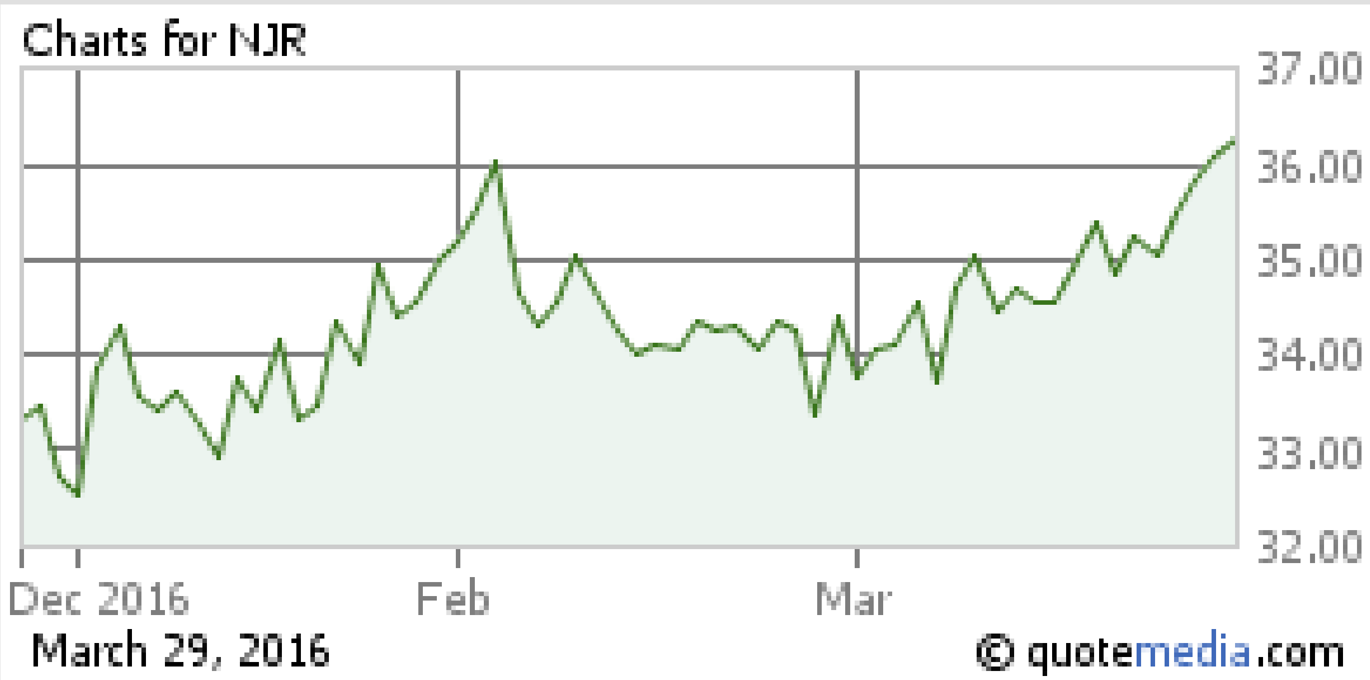
Fiscal Year End	September
Last Reported Quarter	12/31/2015
Next EPS Date	5/5/2016

EPS Information

Current Quarter EPS Consensus Estimate	0.89
Current Year EPS Consensus Estimate	1.61
Estimated Long-Term EPS Growth Rate	6.50
Next EPS Report Date	5/5/2016

Trades from $3

Chart for NJR



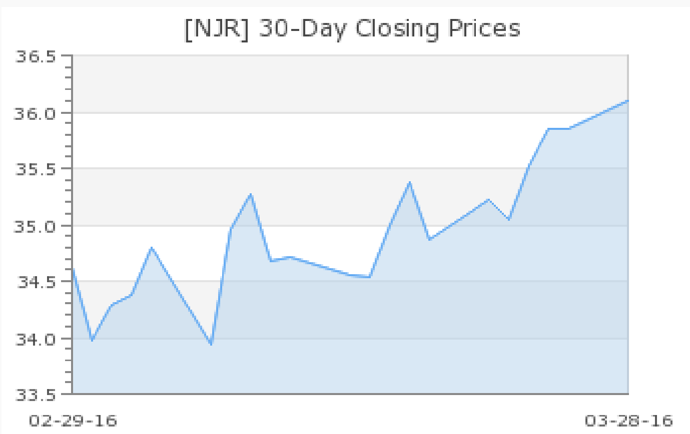
Interactive Chart | Fundamental Charts

Consensus Recommendations

Current (1=Strong Buy, 5=Strong Sell)	2.57
30 Days Ago	2.57
60 Days Ago	2.57
90 Days Ago	2.40

Price And Volume Information

Zacks Rank	
Yesterday's Close	36.09
52 Week High	36.57
52 Week Low	26.77
Beta	0.46
20 Day Moving Average	1,186,619.13
Target Price Consensus	33.13



% Price Change

4 Week	6.70
12 Week	8.77
YTD	8.77

% Price Change Relative to S&P 500

4 Week	2.09
12 Week	9.20
YTD	9.20

Share Information

Shares Outstanding (millions)	85.92
Market Capitalization (millions)	3,080.38
Short Ratio	NA
Last Split Date	3/4/2015

Dividend Information

Dividend Yield	2.68%
Annual Dividend	$0.96
Payout Ratio	0.57
Change in Payout Ratio	0.03
Last Dividend Payout / Amount	3/11/2016 / $0.24

Fundamental Ratios

P/E

P/E (F1)	22.30
Trailing 12 Months	21.21
PEG Ratio	3.43

EPS Growth

vs. Previous Year	-11.11%
vs. Previous Quarter	1,033.33%

Sales Growth

vs. Previous Year	-46.09%
vs. Previous Quarter	1.36%

Price Ratios

Price/Book	2.69
Price/Cash Flow	14.55
Price / Sales	1.31

ROE

12/31/15	12.82
9/30/15	13.51
6/30/15	12.64

ROA

12/31/15	4.34
9/30/15	4.55
6/30/15	4.18

Current Ratio

12/31/15	1.02
9/30/15	1.25
6/30/15	1.40

Quick Ratio

12/31/15	0.68
9/30/15	0.86
6/30/15	1.09

Operating Margin

12/31/15	6.16
9/30/15	5.54
6/30/15	4.75

Net Margin

12/31/15	4.51
9/30/15	6.62
6/30/15	5.28

Pre-Tax Margin

12/31/15	5.12
9/30/15	8.31
6/30/15	6.35

Book Value

12/31/15	13.33
9/30/15	12.81
6/30/15	13.13

Inventory Turnover

Debt-to-Equity

12/31/15	14.22
9/30/15	14.06
6/30/15	12.95

12/31/15	0.74
9/30/15	0.76
6/30/15	0.75

Debt to Capital

12/31/15	42.58
9/30/15	43.25
6/30/15	43.00

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Visit performance for information about the performance numbers displayed above.

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Northwest Nat G: (NWN)

(Real Time Quote From BATS)

Add to portfolio

$53.49 USD

+0.80 (1.52%)

Updated Mar 29, 2016 12:46 PM ET

Volume:	25,975
Open:	$52.68
Prior Close:	$52.69

Zacks Rank :

Style Scores :

ZER Report :

Is NWN a Buy, Hold or Sell?
See its Zacks Rank in our free stock analysis report.
Get Free Report for NWN

Company Summary

NW Natural is principally engaged in the distribution of natural gas. The Oregon Public Utility Commission (OPUC) has allocated to NW Natural as its exclusive service area a major portion of western Oregon, including the Portland metropolitan area, most of the fertile Willamette Valley and the coastal area from Astoria to Coos Bay. NW Natural also holds certificates from the Washington Utilities and Transportation Commission (WUTC) granting it exclusive rights to serve portions of three Washington counties bordering the Columbia River.

General Information

NORTHWEST NAT G

ONE PACIFIC SQUARE 220 NW SECOND AVE

PORTLAND, OR 97209

Phone: 503-226-4211

Fax: 503-273-4824

Web: http://www.nwnatural.com

Email: bob.hess@nwnatural.com

Industry	UTIL-GAS DISTR
Sector	Utilities

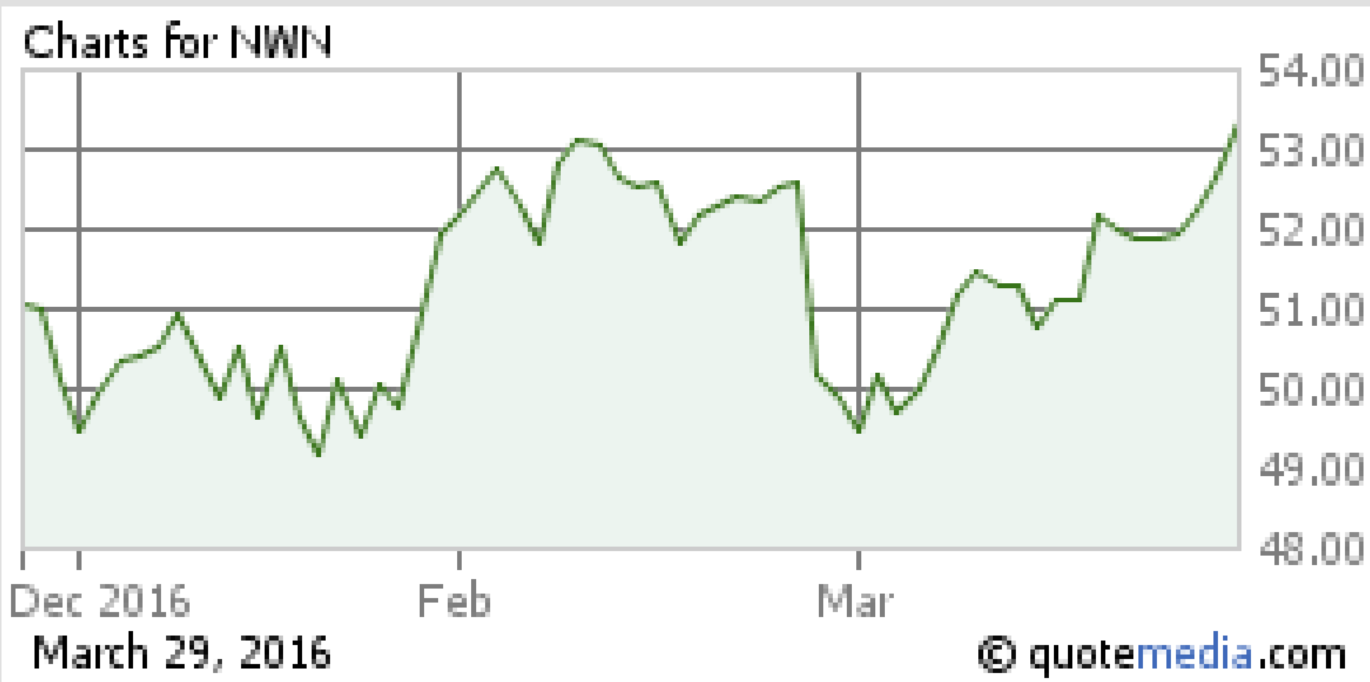
Fiscal Year End	December
Last Reported Quarter	12/31/2015
Next EPS Date	5/3/2016

EPS Information

Current Quarter EPS Consensus Estimate	1.12
Current Year EPS Consensus Estimate	2.16
Estimated Long-Term EPS Growth Rate	4.00
Next EPS Report Date	5/3/2016

Trades from $3

Chart for NWN



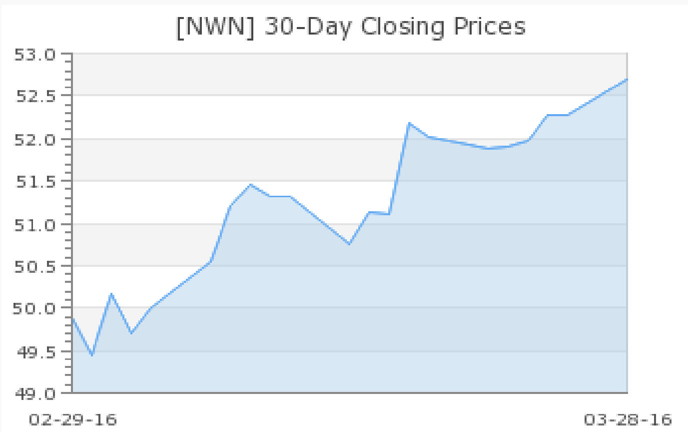
Interactive Chart | Fundamental Charts

Consensus Recommendations

Current (1=Strong Buy, 5=Strong Sell)	3.60
30 Days Ago	3.60
60 Days Ago	3.60
90 Days Ago	3.60

Price And Volume Information

Zacks Rank	
Yesterday's Close	52.69
52 Week High	53.88
52 Week Low	42.00
Beta	0.31
20 Day Moving Average	168,246.30
Target Price Consensus	45.00



% Price Change

4 Week	4.23
12 Week	3.28
YTD	3.28

% Price Change Relative to S&P 500

4 Week	-0.27
12 Week	3.69
YTD	3.69

Share Information

Shares Outstanding (millions)	27.44
Market Capitalization (millions)	1,434.08
Short Ratio	NA
Last Split Date	9/9/1996

Dividend Information

Dividend Yield	3.58%
Annual Dividend	$1.87
Payout Ratio	0.82
Change in Payout Ratio	0.03
Last Dividend Payout / Amount	1/27/2016 / $0.47

Fundamental Ratios

P/E

P/E (F1)	24.24
Trailing 12 Months	22.83
PEG Ratio	6.06

EPS Growth

vs. Previous Year	3.85%
vs. Previous Quarter	550.00%

Sales Growth

vs. Previous Year	-3.98%
vs. Previous Quarter	147.74%

Price Ratios

Price/Book	1.83
Price/Cash Flow	8.85
Price / Sales	1.98

ROE

12/31/15	8.10
9/30/15	7.97
6/30/15	7.72

ROA

12/31/15	2.10
9/30/15	2.06
6/30/15	2.01

Current Ratio

12/31/15	0.70
9/30/15	0.72
6/30/15	0.72

Quick Ratio

12/31/15	0.55
9/30/15	0.51
6/30/15	0.48

Operating Margin

12/31/15	8.67
9/30/15	8.39
6/30/15	8.18

Net Margin

12/31/15	7.42
9/30/15	7.15
6/30/15	6.93

Pre-Tax Margin

12/31/15	12.36
9/30/15	12.14
6/30/15	11.66

Book Value

12/31/15	28.53
9/30/15	27.75
6/30/15	28.43

Inventory Turnover

Debt-to-Equity

12/31/15	6.52
9/30/15	6.55
6/30/15	6.40

12/31/15	0.74
9/30/15	0.82
6/30/15	0.80

Debt to Capital

12/31/15	42.48
9/30/15	45.02
6/30/15	44.45

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South Jersey In: (SJI)

(Real Time Quote From BATS)

Add to portfolio

$28.10 USD

+0.28 (1.01%)

Updated Mar 29, 2016 12:48 PM ET

Volume:	98,174
Open:	$27.82
Prior Close:	$27.82

Zacks Rank :

Style Scores :

ZER Report :

Is SJI a Buy, Hold or Sell?
See its Zacks Rank in our free stock analysis report.
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Company Summary

South Jersey Inds Inc. is engaged in the business of operating, through subsidiaries, various business enterprises. The company's most significant subsidiary is South Jersey Gas Company (SJG). SJG is a public utility company engaged in the purchase, transmission and sale of natural gas for residential, commercial and industrial use. SJG also makes off-system sales of natural gas on a wholesale basis to various customers on the interstate pipeline system and transports natural gas.

General Information

SOUTH JERSEY IN

1 SOUTH JERSEY PLAZA ROUTE 54

FOLSOM, NJ 08037

Phone: 609-561-9000

Fax: 609-561-8225

Web: http://www.sjindustries.com

Email: investorrelations@sjindustries.com

Industry	UTIL-GAS DISTR
Sector	Utilities

Fiscal Year End	December
Last Reported Quarter	12/31/2015
Next EPS Date	5/13/2016

EPS Information

Current Quarter EPS Consensus Estimate	0.82
Current Year EPS Consensus Estimate	1.58
Estimated Long-Term EPS Growth Rate	6.00
Next EPS Report Date	5/13/2016

Trades from $3

Chart for SJI

Interactive Chart | Fundamental Charts

Consensus Recommendations

Current (1=Strong Buy, 5=Strong Sell)	1.75
30 Days Ago	2.33
60 Days Ago	2.33
90 Days Ago	2.00

Price And Volume Information

Zacks Rank	
Yesterday's Close	27.82
52 Week High	28.13
52 Week Low	21.24
Beta	0.58
20 Day Moving Average	374,861.91
Target Price Consensus	28.00

% Price Change

4 Week	5.80
12 Week	17.94
YTD	17.94

% Price Change Relative to S&P 500

4 Week	1.23
12 Week	18.41
YTD	18.41

Share Information

Shares Outstanding (millions)	71.23
Market Capitalization (millions)	1,975.95
Short Ratio	NA
Last Split Date	5/8/2015

Dividend Information

Dividend Yield	3.80%
Annual Dividend	$1.05
Payout Ratio	0.73
Change in Payout Ratio	0.09
Last Dividend Payout / Amount	3/15/2016 / $0.26

Fundamental Ratios

P/E

P/E (F1)	17.53
Trailing 12 Months	19.26
PEG Ratio	2.92

EPS Growth

vs. Previous Year	33.33%
vs. Previous Quarter	985.71%

Sales Growth

vs. Previous Year	-8.27%
vs. Previous Quarter	82.79%

Price Ratios

Price/Book	1.85
Price/Cash Flow	10.12
Price / Sales	2.06

ROE

12/31/15	10.10
9/30/15	9.13
6/30/15	9.48

ROA

12/31/15	2.91
9/30/15	2.58
6/30/15	2.69

Current Ratio

12/31/15	0.52
9/30/15	0.59
6/30/15	0.63

Quick Ratio

12/31/15	0.45
9/30/15	0.53
6/30/15	0.57

Operating Margin

12/31/15	10.33
9/30/15	8.87
6/30/15	9.19

Net Margin

12/31/15	10.95
9/30/15	9.99
6/30/15	11.03

Pre-Tax Margin

12/31/15	14.05
9/30/15	13.58
6/30/15	15.23

Book Value

12/31/15	14.97
9/30/15	13.81
6/30/15	14.17

Inventory Turnover

Debt-to-Equity

12/31/15	14.14
9/30/15	14.23
6/30/15	13.24

12/31/15	0.97
9/30/15	0.99
6/30/15	0.89

Debt to Capital

12/31/15	49.24
9/30/15	49.75
6/30/15	46.98

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Southwest Gas: (SWX)

(Real Time Quote From BATS)

Add to portfolio

$66.25 USD

+1.36 (2.10%)

Updated Mar 29, 2016 12:48 PM ET

Volume:	59,325
Open:	$65.16
Prior Close:	$64.89

Zacks Rank :

Style Scores :

ZER Report :

Is SWX a Buy, Hold or Sell?
See its Zacks Rank in our free stock analysis report.
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Company Summary

SOUTHWEST GAS CORP. is principally engaged in the business of purchasing, transporting, and distributing natural gas in portions of Arizona, Nevada, and California. The Company also engaged in financial services activities, through PriMerit Bank, Federal Savings Bank (PriMerit or the Bank), a wholly owned subsidiary.

General Information

SOUTHWEST GAS

5241 SPRING MOUNTAIN RD PO BOX 98510

LAS VEGAS, NV 89193-8510

Phone: 702-876-7237

Fax: 702-876-7037

Web: http://www.swgas.com

Email: NA

Industry	UTIL-GAS DISTR
Sector	Utilities
Fiscal Year End	December

Last Reported Quarter	12/31/2015
Next EPS Date	5/3/2016

EPS Information

Current Quarter EPS Consensus Estimate	1.62
Current Year EPS Consensus Estimate	3.15
Estimated Long-Term EPS Growth Rate	5.00
Next EPS Report Date	5/3/2016

Trades from $3

Chart for SWX

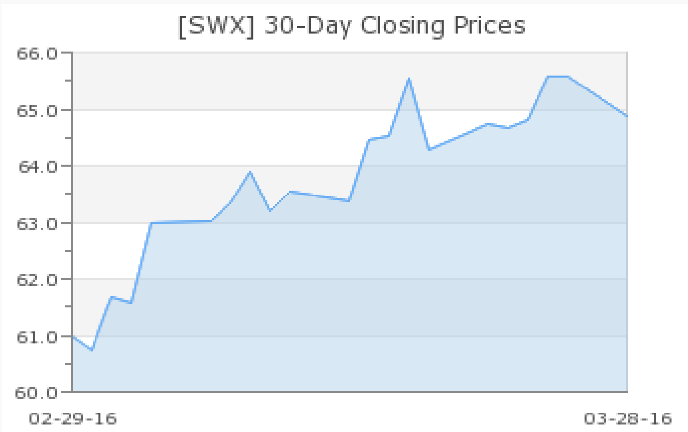
Interactive Chart | Fundamental Charts

Consensus Recommendations

Current (1=Strong Buy, 5=Strong Sell)	2.00
30 Days Ago	2.00
60 Days Ago	2.00
90 Days Ago	2.00

Price And Volume Information

Zacks Rank	
Yesterday's Close	64.89
52 Week High	66.33
52 Week Low	50.53
Beta	0.50
20 Day Moving Average	216,113.91
Target Price Consensus	64.25



% Price Change

4 Week	10.09
12 Week	18.89
YTD	18.89

% Price Change Relative to S&P 500

4 Week	5.34
12 Week	19.36
YTD	19.36

Share Information

Shares Outstanding (millions)	47.46
Market Capitalization (millions)	3,112.69
Short Ratio	NA
Last Split Date	NA

Dividend Information

Dividend Yield	2.47%

Annual Dividend	$1.62
Payout Ratio	0.56
Change in Payout Ratio	0.10
Last Dividend Payout / Amount	2/11/2016 / $0.41

Fundamental Ratios

P/E

P/E (F1)	20.81
Trailing 12 Months	22.54
PEG Ratio	4.16

EPS Growth

vs. Previous Year	10.40%
vs. Previous Quarter	1,480.00%

Sales Growth

vs. Previous Year	9.20%
vs. Previous Quarter	35.62%

Price Ratios

Price/Book	1.95
Price/Cash Flow	7.67
Price / Sales	1.26

ROE

12/31/15	8.86
9/30/15	8.54
6/30/15	9.12

ROA

12/31/15	2.65
9/30/15	2.53
6/30/15	2.73

Current Ratio

12/31/15	1.04
9/30/15	0.97
6/30/15	1.03

Quick Ratio

12/31/15	1.04
9/30/15	0.97
6/30/15	1.03

Operating Margin

12/31/15	5.61
9/30/15	5.44
6/30/15	5.90

Net Margin

12/31/15	5.61
9/30/15	5.44
6/30/15	5.90

Pre-Tax Margin

12/31/15	8.90
9/30/15	8.74
6/30/15	9.32

Book Value

12/31/15	33.61
9/30/15	32.90
6/30/15	33.08

Inventory Turnover

Debt-to-Equity

12/31/15	NA	12/31/15	0.97
9/30/15	NA	9/30/15	1.00
6/30/15	NA	6/30/15	0.98

Debt to Capital

12/31/15	49.60
9/30/15	50.10
6/30/15	49.86

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Wgl Hldgs Inc: (WGL)

(Real Time Quote From BATS)

Add to portfolio

$71.91 USD

+1.13 (1.60%)

Updated Mar 29, 2016 12:50 PM ET

Volume:	54,116
Open:	$70.83
Prior Close:	$70.78

Zacks Rank :

Style Scores :

ZER Report :

Is WGL a Buy, Hold or Sell?
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Company Summary

WASHINGTON GAS LIGHT CO is a public utility that delivers and sells natural gas to metropolitan Washington, D.C. and adjoining areas in Maryland and Virginia. A distribution subsidiary serves portions of Virginia and West Virginia. The Company has four wholly-owned active subsidiaries that include: Shenandoah Gas Company (Shenandoah) is engaged in the delivery and sale of natural gas at retail in the Shenandoah Valley, including Winchester, Middletown, Strasburg, Stephens City and New Market, Virginia, and Martinsburg, West Virginia.

General Information

WGL HLDGS INC

101 CONSTITUTION AVE N.W.

WASHINGTON, DC 20080

Phone: 202-624-6011

Fax: 703-750-4828

Web: http://www.wglholdings.com

Email: douglas.bonawitz@washgas.com

Industry	UTIL-GAS DISTR
Sector	Utilities

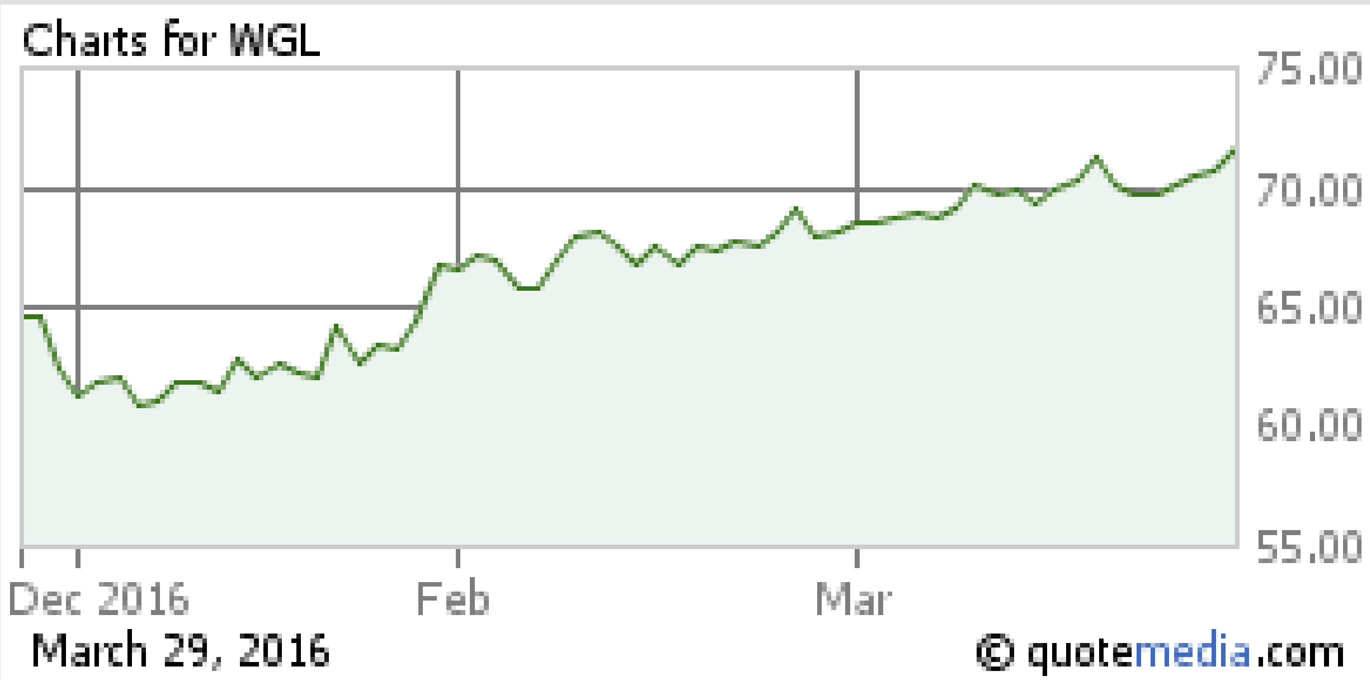
Fiscal Year End	September
Last Reported Quarter	12/31/2015
Next EPS Date	5/4/2016

EPS Information

Current Quarter EPS Consensus Estimate	1.95
Current Year EPS Consensus Estimate	3.15
Estimated Long-Term EPS Growth Rate	7.30
Next EPS Report Date	5/4/2016

Trades from $3

Chart for WGL



Interactive Chart | Fundamental Charts

Consensus Recommendations

Current (1=Strong Buy, 5=Strong Sell)	3.17
30 Days Ago	3.00
60 Days Ago	3.00
90 Days Ago	3.00

Price And Volume Information

Zacks Rank	
Yesterday's Close	70.78
52 Week High	71.80
52 Week Low	51.86
Beta	0.49
20 Day Moving Average	260,033.91
Target Price Consensus	61.75

% Price Change

4 Week	3.86
12 Week	11.99
YTD	11.99

% Price Change Relative to S&P 500

4 Week	-0.63
12 Week	12.43
YTD	12.43

Share Information

Shares Outstanding (millions)	49.85
Market Capitalization (millions)	3,516.28
Short Ratio	NA
Last Split Date	5/2/1995

Dividend Information

Dividend Yield	2.62%
Annual Dividend	$1.85
Payout Ratio	0.58
Change in Payout Ratio	-0.07
Last Dividend Payout / Amount	1/6/2016 / $0.46

Fundamental Ratios

P/E

P/E (F1)	22.42
Trailing 12 Months	22.11
PEG Ratio	3.06

EPS Growth

vs. Previous Year	1.72%
vs. Previous Quarter	613.04%

Sales Growth

vs. Previous Year	-18.13%
vs. Previous Quarter	31.15%

Price Ratios

Price/Book	2.73
Price/Cash Flow	11.38
Price / Sales	1.39

ROE

12/31/15	12.53
9/30/15	12.55
6/30/15	12.78

ROA

12/31/15	3.05
9/30/15	3.08
6/30/15	3.21

Current Ratio

12/31/15	0.78
9/30/15	0.79
6/30/15	0.96

Quick Ratio

12/31/15	0.58
9/30/15	0.56
6/30/15	0.75

Operating Margin

12/31/15	6.33
9/30/15	5.96
6/30/15	6.10

Net Margin

12/31/15	5.42
9/30/15	4.98
6/30/15	6.38

Pre-Tax Margin

12/31/15	8.60
9/30/15	8.14
6/30/15	10.32

Book Value

12/31/15	25.86
9/30/15	25.00
6/30/15	25.47

Inventory Turnover

Debt-to-Equity

12/31/15	10.61
9/30/15	10.13
6/30/15	8.57

12/31/15	0.73
9/30/15	0.76
6/30/15	0.75

Debt to Capital

12/31/15	41.79
9/30/15	42.62
6/30/15	42.34

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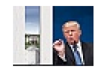
Nasdaq 4783.71 16.93(0.36%)
S&P 500 2034.69 -2.36(-0.12%)
DJIA 17497.38 -38.01(-0.22%)
Gold 1227.50 7.40(0.61%)
Light Crude 38.15 -1.24(-3.15%)

Morningstar Advisor Digest

Atmos Energy Corp ATO |



Populist politics escalating

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Valuation | **Wall Street Estimates**

Annual Earnings Estimates ATO

	09/2016		09/2017	
	USD	Growth %	USD	Growth %
High	3.30	6.8	3.50	6.1
Low	3.29	6.5	3.41	3.6
Mean	3.30	6.8	3.46	4.8
Median	3.30	6.8	3.46	4.8
30 Days Ago	3.30	6.8	3.46	4.8
60 Days Ago	3.30	6.8	3.46	4.8
90 Days Ago	—	—	—	—
Number of Estimates		2		2

Data as of 03/28/2016

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AD: **Is A.I. ethical?**

Analyst Ratings ATO

Five-Year Growth Forecast	Industry Avg
6.2%	—

Average Rating	Last Month	Industry Avg	S&P 500 Avg
2.5	—	—	—

Rating Scale: 5=Buy, 1=Sell

Total Number of Analysts:

Buy	0
Outperform	0
Hold	1
Underperform	1
Sell	0

Data as of 03/28/2016

0 1 2 3

Source: Morningstar Consensus Estimate data

Forward Comparisons ATO

	5Y Growth Forecast %	Forward P/E	PEG Ratio
ATO	6.2	21.0	3.4
Industry	—	—	—
S&P 500	9.4	16.8	—

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Investment Categories by: Topic | Sector | Key Indicators | User Interest | Market Cap | Industry
Premium Stocks by: Name | Ticker | Star Rating | Market Cap | Stock Type | Sector | Industry
Premium Mutual Funds by: Star Rating | Investment Style | Total Assets | Category | Top Holdings | Top Sectors | Symbol / Ticker | Name
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Nasdaq	S&P 500	DJIA	Gold	Light Crude
4783.71 16.93(0.36%)	2034.69 -2.36(-0.12%)	17496.32 -39.07(-0.22%)	1227.50 7.40(0.61%)	38.15 -1.24(-3.15%)

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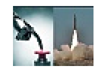
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Valuation **Wall Street Estimates**

Annual Earnings Estimates CPK

	—		12/2016	
	USD	Growth %	USD	Growth %
High	—	—	3.00	—
Low	—	—	3.00	—
Mean	—	—	3.00	—
Median	—	—	3.00	—
30 Days Ago	—	—	—	—
60 Days Ago	—	—	—	—
90 Days Ago	—	—	—	—
Number of Estimates		—		1

Data as of 02/23/2015

AD:Top 20 Federal Opportunities for FY 2016

Analyst Ratings CPK

Five-Year Growth Forecast
3.0%

Industry Avg
—

Average Rating	Last Month	Industry Avg	S&P 500 Avg
—	—	—	—

Rating Scale: 5=Buy, 1=Sell

Total Number of Analysts:

Buy	—
Outperform	—
Hold	—
Underperform	—
Sell	—

Data as of —

0 1 2 3

Source: Morningstar Consensus Estimate data

Forward Comparisons CPK

	5Y Growth Forecast %	Forward P/E	PEG Ratio
CPK	3.0	—	—
Industry	—	—	—
S&P 500	9.4	16.8	—

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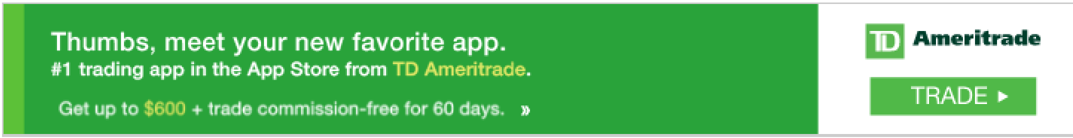

Nasdaq 4783.70 16.91(0.35%) | S&P 500 2034.60 -2.45(-0.12%) | DJIA 17496.83 -38.56(-0.22%) | Gold 1227.50 7.40(0.61%) | Light Crude 38.15 -1.24(-3.15%)

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Annual Earnings Estimates LG

	09/2016 USD	09/2016 Growth %	09/2017 USD	09/2017 Growth %
High	3.40	7.6	3.55	4.4
Low	3.37	6.6	3.50	3.9
Mean	3.38	7.0	3.52	4.1
Median	3.38	7.0	3.52	4.1
30 Days Ago	3.38	7.0	3.52	4.1
60 Days Ago	3.38	7.0	3.52	4.1
90 Days Ago	—	—	—	—
Number of Estimates		2		2

Data as of 03/28/2016

AD: Is A.I. ethical?

Analyst Ratings LG

Five-Year Growth Forecast
—

Industry Avg
—

Average Rating	Last Month	Industry Avg	S&P 500 Avg
4.0	—	—	—

Rating Scale: 5=Buy, 1=Sell

Total Number of Analysts:

Buy	1
Outperform	0
Hold	1
Underperform	0
Sell	0

Data as of 03/28/2016

0 1 2 3

Source: Morningstar Consensus Estimate data

Forward Comparisons LG

	5Y Growth Forecast %	Forward P/E	PEG Ratio
LG	—	18.9	—
Industry	—	—	—
S&P 500	9.4	16.8	—

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Nasdaq 4783.70 16.91(0.35%) | S&P 500 2034.82 -2.23(-0.11%) | DJIA 17498.99 -36.40(-0.21%) | Gold 1227.50 7.40(0.61%) | Light Crude 38.15 -1.24(-3.15%) | Get Organized.

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New Jersey Resources Corp NJR |

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Valuation | **Wall Street Estimates**

Annual Earnings Estimates NJR

	09/2016		09/2017	
	USD	Growth %	USD	Growth %
High	1.80	-14.3	1.85	2.8
Low	1.69	-19.5	1.79	5.9
Mean	1.74	-17.1	1.82	4.6
Median	1.74	-17.1	1.82	4.6
30 Days Ago	1.72	-18.1	1.85	7.6
60 Days Ago	1.72	-18.1	1.85	7.6
90 Days Ago	—	—	—	—
Number of Estimates		2		1

Data as of 03/28/2016

AD:Top 20 Government Contracts for FY2016

Analyst Ratings NJR

Five-Year Growth Forecast		Industry Avg	
3.3%		—	
Average Rating	**Last Month**	**Industry Avg**	**S&P 500 Avg**
3.5	—	—	—

Rating Scale: 5=Buy, 1=Sell

Total Number of Analysts:

Buy	1
Outperform	0
Hold	0
Underperform	1
Sell	0

Data as of 03/28/2016

0 1 2 3

Source: Morningstar Consensus Estimate data

Forward Comparisons NJR

	5Y Growth Forecast %	Forward P/E	PEG Ratio
NJR	3.3	19.8	6.0
Industry	—	—	—
S&P 500	9.4	16.8	—

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Nasdaq	S&P 500	DJIA	Gold	Light Crude
4783.70 16.91(0.35%)	2034.82 -2.23(-0.11%)	17498.99 -36.40(-0.21%)	1227.50 7.40(0.61%)	38.15 -1.24(-3.15%)

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Valuation **Wall Street Estimates**

Annual Earnings Estimates NWN

	12/2016		12/2017	
	USD	Growth %	USD	Growth %
High	2.15	9.7	2.30	7.0
Low	2.15	9.7	2.30	7.0
Mean	2.15	9.7	2.30	7.0
Median	2.15	9.7	2.30	7.0
30 Days Ago	2.15	9.7	2.30	7.0
60 Days Ago	2.35	19.9	2.50	6.4
90 Days Ago	—	—	—	—
Number of Estimates		1		1

Data as of 03/28/2016

AD: Is A.I. ethical?

Analyst Ratings NWN

Five-Year Growth Forecast	Industry Avg
4.0%	—

Average Rating	Last Month	Industry Avg	S&P 500 Avg
3.0	—	—	—

Rating Scale: 5=Buy, 1=Sell

Total Number of Analysts:

Buy	0
Outperform	0
Hold	1
Underperform	0
Sell	0

Data as of 03/28/2016

0 1 2 3

Source: Morningstar Consensus Estimate data

Forward Comparisons NWN

	5Y Growth Forecast %	Forward P/E	PEG Ratio
NWN	4.0	22.9	—
Industry	—	—	—
S&P 500	9.4	16.8	—

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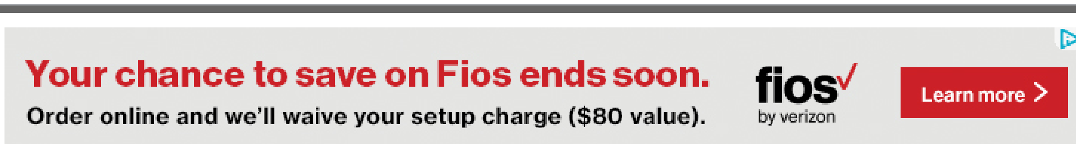

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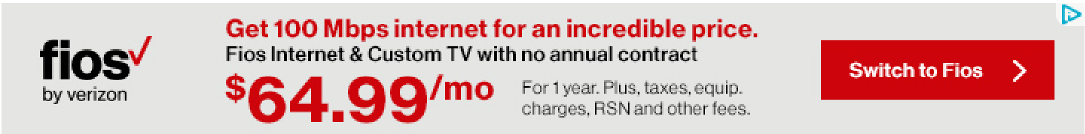

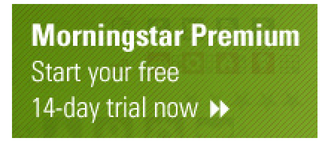

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Nasdaq 4782.20 15.42(0.32%) **S&P 500** 2034.38 -2.67(-0.13%) **DJIA** 17497.04 -38.35(-0.22%) **Gold** 1227.50 7.40(0.61%) **Light Crude** 38.15 -1.24(-3.15%) iPad

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South Jersey Industries Inc SJI

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Valuation | **Wall Street Estimates**

Annual Earnings Estimates SJI

	12/2016		12/2017	
	USD	Growth %	USD	Growth %
High	1.59	4.6	1.41	-11.3
Low	1.59	4.6	1.41	-11.3
Mean	1.59	4.6	1.41	-11.3
Median	1.59	4.6	1.41	-11.3
30 Days Ago	—	—	—	—
60 Days Ago	—	—	—	—
90 Days Ago	—	—	—	—
Number of Estimates		1		1

Data as of 03/28/2016

AD: **Is A.I. ethical?**

Analyst Ratings SJI

Five-Year Growth Forecast	Industry Avg
6.0%	—

Average Rating	Last Month	Industry Avg	S&P 500 Avg
5.0	—	—	—

Rating Scale: 5=Buy, 1=Sell

Total Number of Analysts:

Buy	1
Outperform	0
Hold	0
Underperform	0
Sell	0

Data as of 03/28/2016

0 1 2 3

Source: Morningstar Consensus Estimate data

Forward Comparisons SJI

	5Y Growth Forecast %	Forward P/E	PEG Ratio
SJI	6.0	19.7	3.3
Industry	—	—	—
S&P 500	9.4	16.8	—

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Nasdaq	S&P 500	DJIA	Gold	Light Crude
4782.20 15.42(0.32%)	2034.38 -2.67(-0.13%)	17497.04 -38.35(-0.22%)	1227.50 7.40(0.61%)	38.15 -1.24(-3.15%)

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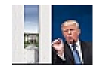
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Annual Earnings Estimates SWX

	12/2016		12/2017	
	USD	Growth %	USD	Growth %
High	3.25	11.3	3.40	4.6
Low	3.15	7.9	3.35	6.3
Mean	3.20	9.6	3.38	5.6
Median	3.20	9.6	3.38	5.6
30 Days Ago	3.20	9.6	3.35	4.7
60 Days Ago	3.25	11.3	3.45	6.2
90 Days Ago	—	—	—	—
Number of Estimates		2		1

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Analyst Ratings SWX

Five-Year Growth Forecast
—

Industry Avg
—

Average Rating	Last Month	Industry Avg	S&P 500 Avg
5.0	—	—	—

Rating Scale: 5=Buy, 1=Sell

Total Number of Analysts:

Buy	2
Outperform	0
Hold	0
Underperform	0
Sell	0

Data as of 03/28/2016

0 1 2 3

Source: Morningstar Consensus Estimate data

Forward Comparisons SWX

	5Y Growth Forecast %	Forward P/E	PEG Ratio
SWX	—	19.2	—
Industry	—	—	—
S&P 500	9.4	16.8	—

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Nasdaq	S&P 500	DJIA	Gold	Light Crude
4781.74 14.95(0.31%)	2034.22 -2.83(-0.14%)	17494.30 -41.09(-0.23%)	1227.50 7.40(0.61%)	38.15 -1.24(-3.15%)

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Valuation | **Wall Street Estimates**

Annual Earnings Estimates WGL

	09/2016 USD	09/2016 Growth %	09/2017 USD	09/2017 Growth %
High	3.10	18.3	3.18	2.6
Low	3.10	18.3	3.18	2.6
Mean	3.10	18.3	3.18	2.6
Median	3.10	18.3	3.18	2.6
30 Days Ago	3.10	18.3	3.18	2.6
60 Days Ago	2.95	12.6	—	—
90 Days Ago	—	—	—	—
Number of Estimates		1		1

Data as of 03/28/2016

AD: Is A.I. ethical?

Analyst Ratings WGL

Five-Year Growth Forecast
5.6%

Industry Avg
—

Average Rating	Last Month	Industry Avg	S&P 500 Avg
2.0	—	—	—

Rating Scale: 5=Buy, 1=Sell

Total Number of Analysts:

Buy	0
Outperform	0
Hold	0
Underperform	1
Sell	0

Data as of 03/28/2016

0 1 2 3

Source: Morningstar Consensus Estimate data

Forward Comparisons WGL

	5Y Growth Forecast %	Forward P/E	PEG Ratio
WGL	5.6	22.3	4.0
Industry	—	—	—
S&P 500	9.4	16.8	—

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Detailed Estimates

Atmos Energy Corporation (NYSE: ATO)

Earnings Metric: Earnings per share
View: Standard

Mean Recommendation and Target Price

	3Pt Recommendation	Target Price ($)
Mean	1.8	66.56
# of Analysts	10	9

Mean Diluted EPS Estimates

	EPS Estimates ($)		
	03/16Q	09/16FY	09/17FY
Mean	**1.39**	**3.26**	**3.51**
# of Analysts	7	10	10

Median LTGR

	LTGR (%)
Median	7.0
# of Analysts	1

Individual Analysts' Recommendation, Target Prices, LTGR and Diluted EPS Estimates

		Recommendation Scale				EPS Estimates ($)			
Broker	**Analyst**	**5Pt.***	**Broker**	**Target Price ($)**	**LTGR (%)**	**03/16Q**	**09/16FY**	**09/17FY**	**Current Estimate Last Reviewed**
J.J.B. Hilliard W.L. Lyons LLC	S.Joyce	3	Neutral	NA	NA	1.43	3.29	3.59	2/3/2016
U.S. Capital Advisors LLC	D.Fidell	3	Hold	64.00	NA	1.37	3.30	3.50	3/10/2016

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Morningstar Inc.	C. Fishman

Footnotes

Announcement Date	Period Affected	Comments	Additional Detail
Company-Issued Guidance:			
2/2/2016	09/16Y	EPS: 3.20-3.40	
12/4/2015	09/16Y	EPS: 3.20-3.40	
11/5/2015	09/16Y	EPS: 3.20-3.40	
9/25/2013	09/16Y	EPS: 3.00-3.20	
8/7/2013	09/16Y	EPS: 3.00-3.20	
5/16/2013	09/16Y	EPS: 3.00-3.20	

If you would like to see your estimates tracked, please contact rrsupport@snl.com.

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Detailed Estimates

Chesapeake Utilities Corporation (NYSE: CPK)

Earnings Metric: Earnings per share
View: Standard

Mean Recommendation and Target Price

	3Pt Recommendation	Target Price ($)
Mean	2.0	59.33
# of Analysts	4	3

Mean Diluted EPS Estimates

	EPS Estimates ($)		
	03/16Q	12/16FY	12/17FY
Mean	**1.50**	**3.01**	**3.18**
# of Analysts	3	4	4

Median LTGR

	LTGR (%)
Median	NA
# of Analysts	NA

Individual Analysts' Recommendation, Target Prices, LTGR and Diluted EPS Estimates

		Recommendation Scale				EPS Estimates ($)			Current Estimate
Broker	Analyst	5Pt.*	Broker	Target Price ($)	LTGR (%)	03/16Q	12/16FY	12/17FY	Last Reviewed
J.J.B. Hilliard W.L. Lyons LLC	S.Joyce	3	Neutral	NA	NA	1.64	3.15	3.40	2/26/2016
Janney Montgomery Scott LLC	M.Gaugler	3	Neutral	NA	NA	1.46	2.89	3.18	3/3/2016
Robert W. Baird & Co.	D.Parker	3	Neutral	62.00	NA	1.35	2.85	3.00	3/2/2016
U.S. Capital Advisors LLC	D.Fidell	3	Hold	60.00	NA	1.40	3.00	3.15	3/10/2016

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Detailed Estimates

Laclede Group, Inc. (The) (NYSE: LG)

Earnings Metric: Earnings per share
View: Standard

Mean Recommendation and Target Price

	3Pt Recommendation	Target Price ($)
Mean	1.8	65.50
# of Analysts	9	6

Mean Diluted EPS Estimates

	EPS Estimates ($)		
	03/16Q	09/16FY	09/17FY
Mean	**2.28**	**3.37**	**3.52**
# of Analysts	7	10	10

Median LTGR

	LTGR (%)
Median	4.7
# of Analysts	3

Individual Analysts' Recommendation, Target Prices, LTGR and Diluted EPS Estimates

		Recommendation Scale				EPS Estimates ($)			
Broker	**Analyst**	**5Pt.***	**Broker**	**Target Price ($)**	**LTGR (%)**	**03/16Q**	**09/16FY**	**09/17FY**	**Current Estimate Last Reviewed**
J.J.B. Hilliard W.L. Lyons LLC	S.Joyce	2	Long Term Buy	72.00	NA	2.26	3.35	3.58	2/4/2016
RBC Capital Markets LLC	I.Kim				No Access				
Stifel Nicolaus & Co.	S.Akyol	3	Hold	NA	NA	2.22	3.30	3.45	2/3/2016
U.S. Capital Advisors LLC	D.Fidell	3	Hold	62.00	NA	2.32	3.40	3.50	3/10/2016

Additional Analyst Coverage

Broker	Analyst
G.research LLC	T. Winter
Wells Fargo Securities LLC	S. Akers

Footnotes

Announcement Date	Period Affected	Comments	Additional Detail
Company-Issued Guidance:			
2/3/2016	09/16Y	EPS: 3.34-3.44	Economic EPS
11/24/2015	09/16Y	EPS: 3.34-3.44	Economic EPS

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Detailed Estimates

New Jersey Resources Corporation (NYSE: NJR)

Earnings Metric: Earnings per share
View: Standard

Mean Recommendation and Target Price

	3Pt Recommendation	Target Price ($)
Mean	2.1	32.90
# of Analysts	8	5

Mean Diluted EPS Estimates

	EPS Estimates ($)		
	03/16Q	09/16FY	09/17FY
Mean	**0.88**	**1.62**	**1.77**
# of Analysts	4	8	8

Median LTGR

	LTGR (%)
Median	6.0
# of Analysts	3

Individual Analysts' Recommendation, Target Prices, LTGR and Diluted EPS Estimates

		Recommendation Scale				EPS Estimates ($)			
Broker	**Analyst**	**5Pt.***	**Broker**	**Target Price ($)**	**LTGR (%)**	**03/16Q**	**09/16FY**	**09/17FY**	**Current Estimate Last Reviewed**
J.J.B. Hilliard W.L. Lyons LLC	S.Joyce	3	Neutral	NA	NA	0.53	1.63	1.79	2/3/2016
Janney Montgomery Scott LLC	M.Gaugler	1	Buy	NA	NA	0.84	1.63	1.94	2/8/2016
U.S. Capital Advisors LLC	D.Fidell	3	Hold	31.00	NA	0.90	1.60	1.70	3/10/2016

Additional Analyst Coverage

Broker	Analyst
Argus Research Corporation	G. Hovis
Ladenburg Thalmann & Co.	B. Russo
Morningstar Inc.	C. Fishman
Wells Fargo Securities LLC	S. Akers

Footnotes

Announcement Date	Period Affected	Comments	Additional Detail
Company-Issued Guidance:			
2/3/2016	09/16Y	EPS: 1.55-1.65	
1/20/2016	09/16Y	EPS: 1.55-1.65	
12/9/2015	09/16Y	EPS: 1.55-1.65	
11/24/2015	09/16Y	EPS: 1.55-1.65	
10/21/2014	09/17Y	EPS: 1.64-1.86	
8/6/2014	09/17Y	EPS: 1.64-1.86	
6/25/2014	09/17Y	EPS: 1.64-1.86	
6/19/2014	09/17Y	EPS: 1.64-1.86	
5/7/2014	09/17Y	EPS: 1.64-1.86	
10/29/2013	09/17Y	EPS: 1.61-1.75	
10/23/2013	09/17Y	EPS: 1.61-1.75	
9/26/2013	09/17Y	EPS: 1.61-1.75	
8/7/2013	09/17Y	EPS: 1.58-1.77	

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Detailed Estimates

New Jersey Resources Corporation (NYSE: NJR)

five (5) the weakest.

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Detailed Estimates

Northwest Natural Gas Company (NYSE: NWN)

Earnings Metric: Earnings per share
View: Standard

Mean Recommendation and Target Price

	3Pt Recommendation	Target Price ($)
Mean	2.1	45.00
# of Analysts	4	2

Mean Diluted EPS Estimates

	EPS Estimates ($)		
	03/16Q	12/16FY	12/17FY
Mean	**1.27**	**2.16**	**2.24**
# of Analysts	3	4	4

Median LTGR

	LTGR (%)
Median	4.0
# of Analysts	1

Individual Analysts' Recommendation, Target Prices, LTGR and Diluted EPS Estimates

Broker	Analyst	Recommendation Scale		Target Price ($)	LTGR (%)	EPS Estimates ($)			Current Estimate Last Reviewed
		5Pt.*	Broker			03/16Q	12/16FY	12/17FY	
J.J.B. Hilliard W.L. Lyons LLC	S.Joyce	3	Neutral	NA	NA	1.33	2.16	2.12	2/26/2016
U.S. Capital Advisors LLC	D.Fidell	3	Hold	45.00	NA	NA	2.20	2.35	3/10/2016

Additional Analyst Coverage

Broker	Analyst
G.research LLC	T. Winter

Footnotes

Announcement Date	Period Affected	Comments	Additional Detail
Company-Issued Guidance:			
2/26/2016	12/16Y	EPS: 1.98-2.18	Exclude the effects of the pre-tax charge of $3.3 million or $0.07 per share after-tax: $2.05 to $2.25

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Detailed Estimates

South Jersey Industries, Inc. (NYSE: SJI)

Earnings Metric: Earnings per share
View: Standard

Mean Recommendation and Target Price

	3Pt Recommendation	Target Price ($)
Mean	1.4	30.00
# of Analysts	5	3

Mean Diluted EPS Estimates

	EPS Estimates ($)		
	03/16Q	12/16FY	12/17FY
Mean	**0.82**	**1.58**	**1.58**
# of Analysts	4	5	5

Median LTGR

	LTGR (%)
Median	6.0
# of Analysts	1

Individual Analysts' Recommendation, Target Prices, LTGR and Diluted EPS Estimates

		Recommendation Scale				EPS Estimates ($)			
Broker	**Analyst**	**5Pt.***	**Broker**	**Target Price ($)**	**LTGR (%)**	**03/16Q**	**12/16FY**	**12/17FY**	**Current Estimate Last Reviewed**
J.J.B. Hilliard W.L. Lyons LLC	S.Joyce	3	Neutral	NA	NA	0.80	1.57	1.47	2/29/2016
Janney Montgomery Scott LLC	M.Gaugler	1	Buy	NA	NA	0.81	1.58	1.74	3/4/2016
U.S. Capital Advisors LLC	D.Fidell	2	Overweight	28.00	NA	0.80	1.60	1.70	3/10/2016
Williams Capital Group L.P.	C.Ellinghaus			No Access					

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Detailed Estimates

Southwest Gas Corporation (NYSE: SWX)

Earnings Metric: Earnings per share
View: Standard

Mean Recommendation and Target Price

	3Pt Recommendation	Target Price ($)
Mean	1.6	62.25
# of Analysts	7	4

Mean Diluted EPS Estimates

	EPS Estimates ($)		
	03/16Q	12/16FY	12/17FY
Mean	**1.62**	**3.20**	**3.42**
# of Analysts	5	8	8

Median LTGR

	LTGR (%)
Median	4.0
# of Analysts	1

Individual Analysts' Recommendation, Target Prices, LTGR and Diluted EPS Estimates

Broker	Analyst	Recommendation Scale		Target Price ($)	LTGR (%)	EPS Estimates ($)			Current Estimate Last Reviewed
		5Pt.*	Broker			03/16Q	12/16FY	12/17FY	
Jefferies LLC	C.Sighinolfi	No Access							
KeyBanc Capital Markets Inc.	M.Tucker	No Access							
U.S. Capital Advisors LLC	D.Fidell	3	Hold	62.00	NA	1.60	3.25	3.45	3/10/2016

Additional Analyst Coverage

Broker	Analyst
G.research LLC	T. Winter

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Detailed Estimates

WGL Holdings, Inc. (NYSE: WGL)

Earnings Metric: Earnings per share
View: Standard

Mean Recommendation and Target Price

	3Pt Recommendation	Target Price ($)
Mean	2.2	60.00
# of Analysts	7	4

Mean Diluted EPS Estimates

	EPS Estimates ($)		
	03/16Q	09/16FY	09/17FY
Mean	**1.97**	**3.12**	**3.29**
# of Analysts	4	7	7

Median LTGR

	LTGR (%)
Median	7.0
# of Analysts	3

Individual Analysts' Recommendation, Target Prices, LTGR and Diluted EPS Estimates

		Recommendation Scale				EPS Estimates ($)			
Broker	**Analyst**	**5Pt.***	**Broker**	**Target Price ($)**	**LTGR (%)**	**03/16Q**	**09/16FY**	**09/17FY**	**Current Estimate Last Reviewed**
J.J.B. Hilliard W.L. Lyons LLC	S.Joyce	3	Neutral	NA	NA	2.00	3.18	3.31	2/8/2016
Janney Montgomery Scott LLC	M.Gaugler	3	Neutral	NA	NA	1.93	3.18	3.22	2/8/2016
U.S. Capital Advisors LLC	D.Fidell	3	Hold	63.00	NA	1.95	3.10	3.35	3/10/2016

Additional Analyst Coverage

Broker	Analyst
Morningstar Inc.	M. Barnett
Wells Fargo Securities LLC	S. Akers

Footnotes

Announcement Date	Period Affected	Comments	Additional Detail
Company-Issued Guidance:			
3/15/2016	09/16Y	EPS: 3.00-3.20	Non-GAAP EPS
2/5/2016	09/16Y	EPS: 3.00-3.20	Non-GAAP EPS
11/13/2015	09/16Y	EPS: 3.00-3.20	Non-GAAP EPS
5/7/2012	09/16Y	EPS: 3.15	

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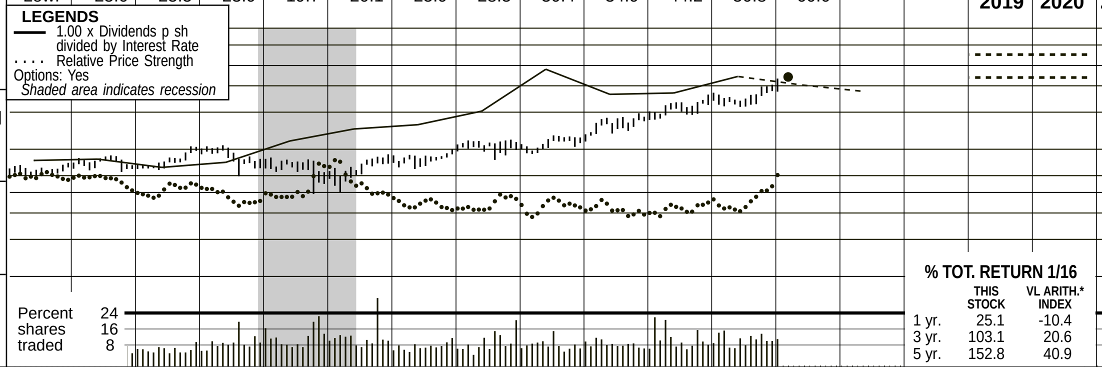
ATMOS ENERGY CORP. NYSE-ATO

RECENT PRICE **70.45** | P/E RATIO **21.7** (Trailing: 22.5 / Median: 15.0) | RELATIVE P/E RATIO **1.28** | DIV'D YLD **2.5%** | VALUE LINE

TIMELINESS **2** Raised 10/30/15
SAFETY **1** Raised 6/6/14
TECHNICAL **3** Raised 3/4/16
BETA .80 (1.00 = Market)

High:	30.0	33.1	33.5	29.3	30.3	32.0	35.6	37.3	47.4	58.2	64.8	71.2
Low:	25.0	25.5	23.9	19.7	20.1	25.9	28.5	30.4	34.9	44.2	50.8	60.0

Target Price Range
2019 | 2020 | 2021



2019-21 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	90	(+30%)	9%
Low	70	(Nil)	3%

Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	0	0	0	0	0
Options	0	6	1	0	0	0	2	7	0
to Sell	0	0	0	0	0	0	0	0	1

Institutional Decisions

	1Q2015	2Q2015	3Q2015
to Buy	157	136	130
to Sell	132	134	137
Hld's(000)	69286	68505	69743

% TOT. RETURN 1/16

	THIS STOCK	VL ARITH.* INDEX
1 yr.	25.1	-10.4
3 yr.	103.1	20.6
5 yr.	152.8	40.9

Atmos Energy's history dates back to 1906 in the Texas Panhandle. Over the years, through various mergers, it became part of Pioneer Corporation, and, in 1981, Pioneer named its gas distribution division Energas. In 1983, Pioneer organized Energas as a separate subsidiary and distributed the outstanding shares of Energas to Pioneer shareholders. Energas changed its name to Atmos in 1988. Atmos acquired Trans Louisiana Gas in 1986, Western Kentucky Gas Utility in 1987, Greeley Gas in 1993, United Cities Gas in 1997, and others.

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	© VALUE LINE PUB. LLC	19-21
75.27	66.03	79.52	53.69	53.12	48.15	38.10	42.88	49.22	40.82	*32.70*	*33.45*	Revenues per sh A	*45.85*
4.26	4.14	4.19	4.29	4.64	4.72	4.76	5.14	5.42	5.81	*5.95*	*6.15*	"Cash Flow" per sh	*7.35*
2.00	1.94	2.00	1.97	2.16	2.26	2.10	2.50	2.96	3.09	*3.25*	*3.45*	Earnings per sh A B	*4.00*
1.26	1.28	1.30	1.32	1.34	1.36	1.38	1.40	1.48	1.56	*1.68*	*1.80*	Div'ds Decl'd per sh C■	*2.15*
5.20	4.39	5.20	5.51	6.02	6.90	8.12	9.32	8.32	9.61	*9.80*	*10.00*	Cap'l Spending per sh	*10.20*
20.16	22.01	22.60	23.52	24.16	24.98	26.14	28.47	30.74	31.48	*31.35*	*32.50*	Book Value per sh	*36.65*
81.74	89.33	90.81	92.55	90.16	90.30	90.24	90.64	100.39	101.48	*107.00*	*110.00*	Common Shs Outst'g D	*120.00*
13.5	15.9	13.6	12.5	13.2	14.4	15.9	15.9	16.1	17.5	*Bold figures are*		Avg Ann'l P/E Ratio	*20.0*
.73	.84	.82	.83	.84	.90	1.01	.89	.85	.89	*Value Line*		Relative P/E Ratio	*1.25*
4.7%	4.2%	4.8%	5.3%	4.7%	4.2%	4.1%	3.5%	3.1%	2.9%	*estimates*		Avg Ann'l Div'd Yield	*2.7%*
6152.4	5898.4	7221.3	4969.1	4789.7	4347.6	3438.5	3886.3	4940.9	4142.1	*3500*	*3680*	Revenues ($mill) A	*5500*
162.3	170.5	180.3	179.7	201.2	199.3	192.2	230.7	289.8	315.1	*350*	*380*	Net Profit ($mill)	*480*
37.6%	35.8%	38.4%	34.4%	38.5%	36.4%	33.8%	38.2%	39.2%	38.3%	*38.5%*	*38.5%*	Income Tax Rate	*40.0%*
2.6%	2.9%	2.5%	3.6%	4.2%	4.6%	5.6%	5.9%	5.9%	7.6%	*10.0%*	*10.3%*	Net Profit Margin	*8.7%*
57.0%	52.0%	50.8%	49.9%	45.4%	49.4%	45.3%	48.8%	44.3%	43.5%	*45.0%*	*45.0%*	Long-Term Debt Ratio	*45.0%*
43.0%	48.0%	49.2%	50.1%	54.6%	50.6%	54.7%	51.2%	55.7%	56.5%	*55.0%*	*55.0%*	Common Equity Ratio	*55.0%*
3828.5	4092.1	4172.3	4346.2	3987.9	4461.5	4315.5	5036.1	5542.2	5650.2	*6100*	*6500*	Total Capital ($mill)	*8000*
3629.2	3836.8	4136.9	4439.1	4793.1	5147.9	5475.6	6030.7	6725.9	7430.6	*8040*	*8500*	Net Plant ($mill)	*10200*
6.1%	5.9%	5.9%	5.9%	6.9%	6.1%	6.1%	5.9%	6.4%	6.6%	*7.0%*	*7.0%*	Return on Total Cap'l	*7.5%*
9.8%	8.7%	8.8%	8.3%	9.2%	8.8%	8.1%	8.9%	9.4%	9.9%	*10.5%*	*10.5%*	Return on Shr. Equity	*11.0%*
9.8%	8.7%	8.8%	8.3%	9.2%	8.8%	8.1%	8.9%	9.4%	9.9%	*10.5%*	*10.5%*	Return on Com Equity	*11.0%*
3.6%	3.0%	3.1%	2.7%	3.5%	3.3%	2.8%	4.0%	4.7%	4.9%	*5.0%*	*5.0%*	Retained to Com Eq	*5.0%*
63%	65%	65%	68%	62%	62%	65%	56%	50%	51%	*51%*	*52%*	All Div'ds to Net Prof	*54%*

CAPITAL STRUCTURE as of 12/31/15
Total Debt $3218.7 mill. **Due in 5 Yrs** $1157.9 mill.
LT Debt $2455.5 mill. **LT Interest** $145.0 mill.
(LT interest earned: 5.4x; total interest coverage: 5.4x)
Leases, Uncapitalized Annual rentals $16.5 mill.
Pfd Stock None
Pension Assets-9/15 $450.9 mill.
Oblig. $508.6 mill.
Common Stock 102,106,896 shs.
as of 1/29/16
MARKET CAP: $7.2 billion (Large Cap)

CURRENT POSITION ($MILL.)	2014	2015	12/31/15
Cash Assets	42.3	28.7	78.9
Other	733.5	602.3	784.4
Current Assets	775.8	631.0	863.3
Accts Payable	311.6	238.9	280.5
Debt Due	196.7	457.9	763.2
Other	402.4	458.0	471.4
Current Liab.	910.7	1154.8	1515.1
Fix. Chg. Cov.	637%	743%	730%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '13-'15 to '19-'21
Revenues	-2.0%	-6.5%	.5%
"Cash Flow"	5.0%	4.5%	5.0%
Earnings	5.5%	7.0%	6.0%
Dividends	2.0%	2.5%	6.5%
Book Value	5.0%	5.0%	3.5%

Fiscal Year Ends	QUARTERLY REVENUES ($ mill.) A Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2013	1034.2	1309.0	857.9	685.2	3886.3
2014	1255.1	1964.3	942.7	778.8	4940.9
2015	1258.8	1540.1	686.4	656.8	4142.1
2016	906.2	*1220*	*700*	*673.8*	*3500*
2017	*950*	*1300*	*730*	*700*	*3680*

Fiscal Year Ends	EARNINGS PER SHARE A B E Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2013	.85	1.23	.36	.08	2.50
2014	.95	1.38	.45	.23	2.96
2015	.96	1.35	.55	.23	3.09
2016	1.00	*1.42*	*.57*	*.26*	*3.25*
2017	*1.06*	*1.47*	*.62*	*.30*	*3.45*

Cal-endar	QUARTERLY DIVIDENDS PAID C■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	.345	.345	.345	.35	1.39
2013	.35	.35	.35	.37	1.42
2014	.37	.37	.37	.39	1.50
2015	.39	.39	.39	.42	1.59
2016	.42				

BUSINESS: Atmos Energy Corporation is engaged primarily in the distribution and sale of natural gas to roughly three million customers through six regulated natural gas utility operations: Louisiana Division, West Texas Division, Mid-Tex Division, Mississippi Division, Colorado-Kansas Division, and Kentucky/Mid-States Division. Gas sales breakdown for fiscal 2015: 66%, residential; 29%, commercial; 3%, industrial; and 2% other. The company has around 4,760 employees. Officers and directors own approximately 1.5% of common stock (12/15 Proxy). President and Chief Executive Officer: Kim R. Cocklin. Incorporated: Texas. Address: Three Lincoln Centre, Suite 1800, 5430 LBJ Freeway, Dallas, Texas 75240. Telephone: 972-934-9227. Internet: www.atmosenergy.com.

Atmos Energy Corporation got off to a respectable start in fiscal 2016 (concludes on September 30th). Specifically, first-quarter earnings per share advanced approximately 4.2%, to $1.00, compared to the same period the prior year. One contributor was the bread-and-butter natural gas distribution operation, which benefited from rate adjustments in the Mid-Tex, Mississippi, and West Texas divisions. Notably, through last December 31st, the company finished four regulatory proceedings resulting in a $13.3 million increase in annual operating income, and seven ratemaking initiatives were in progress seeking another $27.4 million of annual operating income. But results for this segment were constrained a bit by diminished consumption, given warmer-than-usual temperatures. Elsewhere, the regulated pipeline business was boosted by higher revenue from the Gas Reliability Infrastructure Program (GRIP) filing approved in fiscal 2015. A rise in operating expenses provided somewhat of an offset here, however.

We anticipate more of the same during the remaining nine months. Consequently, Atmos' bottom line stands to advance around 5%, to $3.25 a share, for the entire year. Assuming that operating margins expand further, fiscal 2017 share net might well grow at a similar percentage rate, to $3.45.

The stock has traded at record heights since our last report in December. It appears that stems partially from the Dallas-headquartered company's respectable first-quarter profits, and expectations of more glad tidings over the course of the fiscal year. Consequently, these shares possess a 2 (Above Average) rank for Timeliness.

There are other noteworthy characteristics here. The current dividend is decent, and our 2019-2021 projections show that additional, steady increases in the distribution will occur. The payout ratio during that period ought to be in the 50%-55% range, which is manageable. Moreover, the Safety rank resides at 1 (Highest), and the Price Stability rating is excellent (i.e., 95 out of 100). All told, the equity ought to draw the attention of a variety of investors.

Frederick L. Harris, III *March 4, 2016*

(A) Fiscal year ends Sept. 30th. (B) Diluted shrs. Excl. nonrec. items: '06, d18¢; '07, d2¢; '09, 12¢; '10, 5¢; '11, (1¢). Excludes discontinued operations: '11, 10¢; '12, 27¢; '13, 14¢. Next egs. rpt. due early May.
(C) Dividends historically paid in early March, June, Sept., and Dec. ■ Div. reinvestment plan. Direct stock purchase plan avail.
(D) In millions.
(E) Qtrs may not add due to change in shrs outstanding.

Company's Financial Strength	A
Stock's Price Stability	95
Price Growth Persistence	75
Earnings Predictability	95

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CHESAPEAKE UTIL. NYSE-CPK

RECENT PRICE	64.03	P/E RATIO	22.9 (Trailing: 22.8, Median: 15.0)	RELATIVE P/E RATIO	1.36	DIV'D YLD	1.9%	VALUE LINE

TIMELINESS 2 Lowered 3/4/16
SAFETY 2 New 6/5/15
TECHNICAL 3 Raised 3/4/16
BETA .65 (1.00 = Market)

High:	23.9	23.8	24.8	23.2	23.3	28.1	29.7	32.6	40.8	52.7	61.1	67.4
Low:	15.7	18.6	18.7	14.6	14.7	18.7	24.0	26.6	30.6	37.5	44.4	52.3

Target Price Range 2019 | 2020 | 2021

2019-21 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	90	(+40%)	11%
Low	70	(+10%)	4%

Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	1	1	0	1	0	0	0	0
Options	0	0	0	0	0	0	0	0	0
to Sell	0	1	1	0	0	1	0	1	2

Institutional Decisions

	1Q2015	2Q2015	3Q2015
to Buy	45	48	65
to Sell	56	50	55
Hld's(000)	8056	8247	8224

% TOT. RETURN 1/16

	THIS STOCK	VL ARITH.* INDEX
1 yr.	32.1	-10.4
3 yr.	114.5	20.6
5 yr.	178.3	40.9

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	© VALUE LINE PUB. LLC	19-21
42.21	40.82	17.12	19.11	20.70	26.02	23.05	25.41	28.46	19.07	29.93	29.13	27.26	30.73	34.19	**29.65**	**30.00**	**30.30**	Revenues per sh	**37.50**
1.95	1.95	1.93	2.42	2.26	2.35	2.18	2.52	2.50	2.15	3.50	3.69	3.95	4.35	4.73	**4.85**	**5.20**	**5.60**	"Cash Flow" per sh	**7.00**
.93	.83	.69	1.17	1.09	1.18	1.15	1.29	1.39	1.43	1.82	1.91	1.99	2.26	2.47	2.68	**2.90**	**3.15**	Earnings per sh A	**4.00**
.71	.73	.73	.73	.75	.76	.77	.78	.81	.83	.87	.91	.96	1.01	1.07	1.12	**1.19**	**1.26**	Div'ds Decl'd per sh B■	**1.50**
2.75	3.61	1.77	1.39	2.07	3.74	4.87	3.08	3.00	1.89	3.18	3.28	5.00	6.72	6.66	**9.20**	**10.85**	**11.15**	Cap'l Spending per sh	**11.60**
8.05	8.26	8.03	8.59	9.07	9.60	11.08	11.76	12.02	14.89	15.84	16.78	17.82	19.28	20.59	**22.95**	**23.90**	**25.45**	Book Value per sh	**30.45**
7.95	8.09	8.31	8.49	8.60	8.82	10.03	10.17	10.24	14.09	14.29	14.35	14.40	14.46	14.59	**15.50**	**16.50**	**17.00**	Common Shs Outst'g C	**20.00**
12.6	15.0	18.6	12.7	15.0	16.8	17.9	16.7	14.2	14.2	12.2	14.2	14.8	15.6	17.7	19.1	*Bold figures are*		Avg Ann'l P/E Ratio	**20.0**
.82	.77	1.02	.72	.79	.89	.97	.89	.85	.95	.78	.89	.94	.88	.93	.97	*Value Line*		Relative P/E Ratio	**1.25**
6.1%	5.8%	5.7%	4.9%	4.6%	3.8%	3.8%	3.6%	4.1%	4.1%	3.9%	3.4%	3.3%	2.9%	2.4%	2.2%	*estimates*		Avg Ann'l Div'd Yield	**1.9%**

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		19-21
231.2	258.3	291.4	268.8	427.5	418.0	392.5	444.3	498.8	459.2	**495**	**515**	Revenues ($mill)	**750**
10.5	13.2	14.4	15.9	26.1	27.6	28.9	32.8	36.1	40.2	**48.0**	**54.0**	Net Profit ($mill)	**80.0**
39.4%	39.4%	39.1%	41.8%	39.7%	39.4%	40.1%	40.2%	39.9%	39.5%	**40.0%**	**40.0%**	Income Tax Rate	**41.0%**
4.5%	5.1%	4.9%	5.9%	6.1%	6.6%	7.4%	7.4%	7.2%	8.8%	**9.7%**	**10.5%**	Net Profit Margin	**10.7%**
39.0%	34.6%	41.3%	32.0%	28.4%	31.4%	28.4%	29.7%	34.5%	**29.5%**	**29.0%**	**29.0%**	Long-Term Debt Ratio	**30.0%**
61.0%	65.4%	58.7%	68.0%	71.6%	68.6%	71.6%	70.3%	65.5%	**70.5%**	**71.0%**	**71.0%**	Common Equity Ratio	**70.0%**
182.2	182.8	209.5	308.6	315.9	351.1	358.5	396.4	458.8	**505**	**555**	**610**	Total Capital ($mill)	**870**
240.8	260.4	280.7	436.4	462.8	487.7	541.8	631.2	689.8	**855**	**925**	**990**	Net Plant ($mill)	**1250**
7.1%	8.4%	7.9%	6.1%	9.1%	8.9%	8.8%	8.8%	8.5%	**9.0%**	**9.5%**	**9.5%**	Return on Total Cap'l	**10.0%**
9.5%	11.1%	11.7%	7.6%	11.5%	11.5%	11.2%	11.8%	12.0%	**11.5%**	**12.0%**	**12.5%**	Return on Shr. Equity	**13.0%**
9.5%	11.1%	11.7%	7.6%	11.5%	11.5%	11.2%	11.8%	12.0%	**11.5%**	**12.0%**	**12.5%**	Return on Com Equity	**13.0%**
4.1%	5.2%	5.2%	3.8%	6.6%	6.6%	6.4%	7.1%	7.4%	**6.5%**	**7.0%**	**7.5%**	Retained to Com Eq	**8.0%**
57%	53%	55%	50%	42%	42%	43%	40%	38%	**43%**	**41%**	**40%**	All Div'ds to Net Prof	**38%**

CAPITAL STRUCTURE as of 9/30/15
Total Debt $292.1 mill. **Due in 5 Yrs** $145.0 mill.
LT Debt $155.9 mill. **LT Interest** $8.0 mill.
(LT interest earned: 10.5x; total interest coverage: 7.3x) (31% of Cap'l)
Leases, Uncapitalized Annual rentals $1.1 mill.
Pfd Stock None
Pension Assets-12/14 $54.2 mill. **Oblig.** $80.2 mill.
Common Stock 15,268,158 shs. as of 10/31/15

MARKET CAP: $975 million (Small Cap)

CURRENT POSITION ($MILL.)	2013	2014	9/30/15
Cash Assets	3.4	4.6	3.8
Other	123.0	117.8	83.9
Current Assets	126.4	122.4	87.7
Accts Payable	53.5	44.6	41.1
Debt Due	117.0	97.3	136.2
Other	51.4	52.3	59.6
Current Liab.	221.9	194.2	236.9
Fix. Chg. Cov.	919%	865%	845%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '12-'14 to '19-'21
Revenues	5.0%	5.0%	3.0%
"Cash Flow"	7.0%	12.5%	7.0%
Earnings	8.5%	10.5%	8.5%
Dividends	3.0%	4.5%	6.0%
Book Value	8.5%	8.5%	7.0%

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	140.7	94.1	86.6	122.9	444.3
2014	186.3	100.5	91.6	120.4	498.8
2015	170.1	92.7	91.9	104.5	459.2
2016	**180**	**97.0**	**93.0**	**125**	**495**
2017	**185**	**102**	**98.0**	**130**	**515**

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	1.02	.30	.27	.67	2.26
2014	1.21	.35	.22	.69	2.47
2015	1.44	.35	.33	.56	2.68
2016	**1.42**	**.42**	**.39**	**.67**	**2.90**
2017	**1.46**	**.50**	**.45**	**.74**	**3.15**

Cal-endar	QUARTERLY DIVIDENDS PAID B■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	.23	.23	.243	.243	.95
2013	.243	.243	.257	.257	1.00
2014	.257	.257	.27	.27	1.05
2015	.27	.27	.288	.288	1.12
2016	.288				

BUSINESS: Chesapeake Utilities Corporation consists of two units: Regulated Energy and Unregulated Energy. The Regulated Energy segment (around 64% of sales) distributes natural gas in Delaware, Maryland, and Florida; distributes electricity in Florida; and transmits natural gas on the Delmarva Peninsula and in Florida. The Unregulated Energy operation (36% of sales) wholesales and distributes propane; markets natural gas; and provides other unregulated energy services, including midstream services in Ohio. Officers and directors own 5.3% of common stock; T. Rowe Price, 7.6%; BlackRock, 6.2% (3/15 Proxy). CEO: Michael P. McMasters. Incorporated: Delaware. Address: 909 Silver Lake Boulevard, Dover, DE 19904. Telephone: (302) 734-6799. Internet: www.chpk.com.

Earnings for Chesapeake Utilities Corporation may advance at a decent pace this year. There should be growing benefits from last April's acquisition of Gatherco (now called Aspire Energy), providing natural gas midstream services through 16 gathering systems and more than 2,000 miles of pipelines in central and eastern Ohio. Another positive is natural gas transmission expansions completed in 2014 and 2015. At this point, it seems that the company's bottom line will increase about 8%, to $2.90 a share, in 2016, versus $2.68 for last year. If operating margins expand further, 2017 profits might rise at a similar percentage rate, to $3.15 a share.

With an eye on future growth, there are some major projects in the works. One of them involves the development of a CHP plant in Nassau County, Florida, which will include a natural gas-fired turbine and associated electric generator, as well as a heat recovery system capable of providing unfired steam. Operations are slated to commence in this year's third quarter and cost some $40 million. Elsewhere, there are plans to provide an industrial customer in Kent County, Delaware with natural gas transmission services for 20 years. Expenses for the construction of new facilities, expected to be on stream in the third quarter, would be around $33 million. These and other initiatives ought not place a major financial strain on Chesapeake.

The equity has surged to record price levels since our last report three months ago. We think that movement stems partly from the Dover-headquartered company's solid operating performance in 2015, and expectations of more good things this year. Consequently, these shares possess an Above Average (2) rank for Timeliness. Other mentionable qualities are the 2 (Above Average) rating for Safety, lower-than-market Beta coefficient, and relatively high Price Stability score.

The dividend yield presently resides below the average of all stocks in *Value Line's* Natural Gas Utility universe. Still, the payout is well covered by Chesapeake's profits, and future, steady hikes are probable.

Frederick L. Harris, III *March 4, 2016*

(A) Diluted shrs. Excludes nonrecurring items: '02, d23¢; '08, d7¢; Q2 '15, 6¢. Excludes discontinued operations: '03, d9¢; '04, d1¢. Next earnings report due early May.
(B) Dividends historically paid in early January, April, July, and October. ■ Dividend reinvestment plan. Direct stock purchase plan available.
(C) In millions, adjusted for split.

Company's Financial Strength	B++
Stock's Price Stability	85
Price Growth Persistence	85
Earnings Predictability	95

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LACLEDE GROUP NYSE-LG

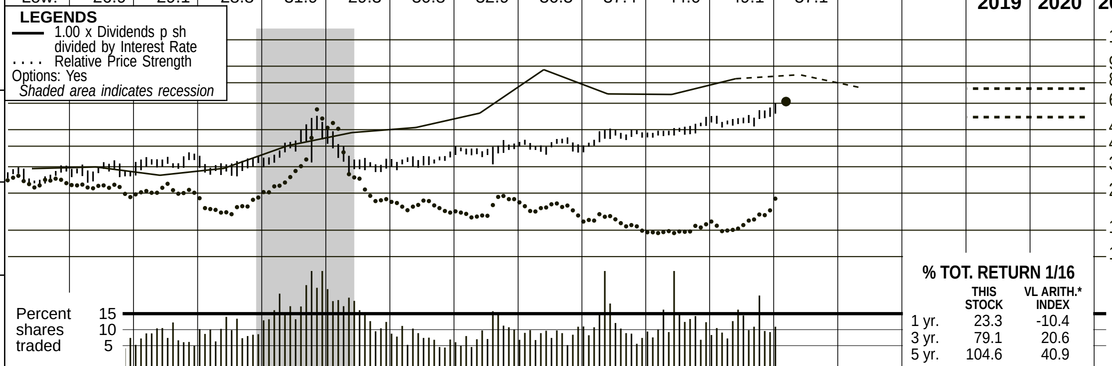
RECENT PRICE **65.18** | P/E RATIO **19.2** (Trailing: 20.7 Median: 14.0) | RELATIVE P/E RATIO **1.14** | DIV'D YLD **3.0%** | **VALUE LINE**

TIMELINESS **3** Raised 10/16/15
SAFETY **2** Raised 6/20/03
TECHNICAL **3** Raised 3/4/16
BETA .70 (1.00 = Market)

High:	34.3	37.5	36.0	55.8	48.3	37.8	42.8	44.0	48.5	55.2	61.0	66.4
Low:	26.9	29.1	28.8	31.9	29.3	30.8	32.9	36.5	37.4	44.0	49.1	57.1

Target Price Range
2019 | 2020 | 2021

LEGENDS
— 1.00 x Dividends p sh divided by Interest Rate
.... Relative Price Strength
Options: Yes
Shaded area indicates recession



2019-21 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	75	(+15%)	7%
Low	55	(-15%)	Nil

Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	0	0	0	0	0
Options	0	0	0	0	0	0	1	0	6
to Sell	0	0	0	0	0	0	0	0	0

Institutional Decisions

	1Q2015	2Q2015	3Q2015
to Buy	116	115	102
to Sell	69	77	95
Hld's(000)	35230	35958	35808

% TOT. RETURN 1/16

	THIS STOCK	VL ARITH.* INDEX
1 yr.	23.3	-10.4
3 yr.	79.1	20.6
5 yr.	104.6	40.9

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	© VALUE LINE PUB. LLC	19-21
29.99	53.08	39.84	54.95	59.59	75.43	93.51	93.40	100.44	85.49	77.83	71.48	49.90	31.10	37.68	45.59	*37.50*	*42.20*	Revenues per sh A	*55.20*
2.68	3.00	2.56	3.15	2.79	2.98	3.81	3.87	4.22	4.56	4.11	4.62	4.58	3.12	3.87	6.15	*6.40*	*6.75*	"Cash Flow" per sh	*7.50*
1.37	1.61	1.18	1.82	1.82	1.90	2.37	2.31	2.64	2.92	2.43	2.86	2.79	2.02	2.35	3.16	*3.40*	*3.60*	Earnings per sh A B	*4.20*
1.34	1.34	1.34	1.34	1.35	1.37	1.40	1.45	1.49	1.53	1.57	1.61	1.66	1.70	1.76	1.84	*1.92*	*1.96*	Div'ds Decl'd per sh C■	*2.20*
2.77	2.51	2.80	2.67	2.45	2.84	2.97	2.72	2.57	2.36	2.56	3.02	4.83	4.00	3.96	6.68	*7.15*	*7.20*	Cap'l Spending per sh	*7.40*
14.99	15.26	15.07	15.65	16.96	17.31	18.85	19.79	22.12	23.32	24.02	25.56	26.67	32.00	34.93	36.30	*38.10*	*39.65*	Book Value per sh D	*44.45*
18.88	18.88	18.96	19.11	20.98	21.17	21.36	21.65	21.99	22.17	22.29	22.43	22.55	32.70	43.18	43.36	*44.00*	*45.00*	Common Shs Outst'g E	*48.00*
14.9	14.5	20.0	13.6	15.7	16.2	13.6	14.2	14.3	13.4	13.7	13.0	14.5	21.3	19.8	16.5	*Bold figures are*		Avg Ann'l P/E Ratio	*15.5*
.97	.74	1.09	.78	.83	.86	.73	.75	.86	.89	.87	.82	.92	1.20	1.04	.84	*Value Line*		Relative P/E Ratio	*.95*
6.6%	5.7%	5.7%	5.4%	4.7%	4.4%	4.3%	4.4%	3.9%	3.9%	4.7%	4.3%	4.1%	4.0%	3.8%	3.5%	*estimates*		Avg Ann'l Div'd Yield	*3.5%*

CAPITAL STRUCTURE as of 12/31/15
Total Debt $2188.6 mill. **Due in 5 Yrs** $525.0 mill.
LT Debt $1851.5 mill. **LT Interest** $70.0 mill.
(Total interest coverage: 4.6x)

Leases, Uncapitalized Annual rentals $11.0 mill.
Pension Assets-9/15 $448.9 mill. **Oblig.** $652.3 mill.
Pfd Stock None
Common Stock 43,424,462 shs. **as of 1/31/16**

MARKET CAP: $2.8 billion (Mid Cap)

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		19-21
1997.6	2021.6	2209.0	1895.2	1735.0	1603.3	1125.5	1017.0	1627.2	1976.4	*1650*	*1900*	Revenues ($mill) A	*2650*
50.5	49.8	57.6	64.3	54.0	63.8	62.6	52.8	84.6	136.9	*150*	*160*	Net Profit ($mill)	*200*
32.5%	33.4%	31.3%	33.6%	33.4%	31.4%	29.6%	25.0%	27.6%	31.2%	*28.0%*	*28.0%*	Income Tax Rate	*30.0%*
2.5%	2.5%	2.6%	3.4%	3.1%	4.0%	5.6%	5.2%	5.2%	6.9%	*9.1%*	*8.5%*	Net Profit Margin	*7.5%*
49.5%	45.3%	44.4%	42.9%	40.5%	38.9%	36.1%	46.6%	55.1%	53.0%	*54.5%*	*52.5%*	Long-Term Debt Ratio	*51.5%*
50.4%	54.6%	55.5%	57.1%	59.5%	61.1%	63.9%	53.4%	44.9%	47.0%	*45.5%*	*47.5%*	Common Equity Ratio	*48.5%*
798.9	784.5	876.1	906.3	899.9	937.7	941.0	1959.0	3359.4	3345.1	*3420*	*3735*	Total Capital ($mill)	*4395*
763.8	793.8	823.2	855.9	884.1	928.7	1019.3	1776.6	2759.7	2941.2	*3090*	*3245*	Net Plant ($mill)	*3755*
8.4%	8.5%	8.1%	8.7%	7.4%	8.1%	7.9%	3.3%	3.1%	5.1%	*5.0%*	*5.0%*	Return on Total Cap'l	*5.0%*
12.5%	11.6%	11.8%	12.4%	10.1%	11.1%	10.4%	5.0%	5.6%	8.7%	*9.0%*	*9.0%*	Return on Shr. Equity	*9.5%*
12.5%	11.6%	11.8%	12.4%	10.1%	11.1%	10.4%	5.0%	5.6%	8.7%	*9.0%*	*9.0%*	Return on Com Equity	*9.5%*
5.1%	4.3%	5.2%	5.9%	3.6%	4.9%	4.3%	1.0%	1.5%	3.7%	*4.0%*	*4.0%*	Retained to Com Eq	*4.5%*
59%	63%	56%	53%	64%	56%	59%	81%	73%	58%	*56%*	*54%*	All Div'ds to Net Prof	*52%*

CURRENT POSITION ($MILL.)	2014	2015	12/31/15
Cash Assets	16.1	13.8	4.6
Other	588.8	516.3	631.4
Current Assets	604.9	530.1	636.0
Accts Payable	176.7	146.5	159.5
Debt Due	287.1	418.0	337.1
Other	319.0	289.3	350.9
Current Liab.	782.8	853.8	847.5
Fix. Chg. Cov.	360%	365%	458%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '13-'15 to '19-'21
Revenues	-5.0%	-15.5%	*6.5%*
"Cash Flow"	4.0%	0.5%	*9.5%*
Earnings	3.0%	-1.0%	*9.0%*
Dividends	2.5%	3.0%	*3.5%*
Book Value	7.5%	8.0%	*4.5%*

Fiscal Year Ends	QUARTERLY REVENUES ($ mill.)A Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2013	307.0	397.6	165.3	147.1	1017.0
2014	468.6	694.5	241.8	222.3	1627.2
2015	619.6	877.4	275.2	204.2	1976.4
2016	399.4	*700*	*200*	*350.6*	*1650*
2017	*475*	*775*	*250*	*400*	*1900*

Fiscal Year Ends	EARNINGS PER SHARE A B F Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2013	1.14	1.34	.25	d.30	2.02
2014	1.09	1.59	.33	d.35	2.35
2015	1.09	2.18	.32	d.43	3.16
2016	1.08	*2.25*	*.35*	*d.28*	*3.40*
2017	*1.20*	*2.30*	*.35*	*d.25*	*3.60*

Cal-endar	QUARTERLY DIVIDENDS PAID C■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	.415	.415	.415	.415	1.66
2013	.425	.425	.425	.425	1.70
2014	.44	.44	.44	.44	1.76
2015	.46	.46	.46	.46	1.84
2016	.49				

BUSINESS: Laclede Group, Inc., is a holding company for Laclede Gas, which distributes natural gas across Missouri, including the cities of St. Louis and Kansas City. Has roughly 1.6 million customers. Purchased SM&P Utility Resources, 1/02; divested, 3/08. Acquired Missouri Gas 9/13, Alabama Gas Co 9/14. Utility therms sold and transported in fiscal 2015: 2.7 bill. Revenue mix for regulated operations: residential, 66%; commercial and industrial, 24%; transportation, 2%; other, 8%. Has around 3,078 employees. Officers and directors own 3.2% of common shares (1/16 proxy). Chairman: Edward Glotzbach; CEO: Suzanne Sitherwood. Inc.: Missouri. Address: 700 Market Street, St. Louis, Missouri 63101. Telephone: 314-342-0500. Internet: www.thelacledegroup.com.

Laclede Group reported worse-than-expected fiscal first-quarter results (ended December 31, 2015). Indeed, earnings were hurt by much-warmer temperatures across the service region, though these were partially offset by a favorable movement in the Alagasco adjustment rate and an increase in the infrastructure system replacement surcharge for infrastructure upgrades. Too, the company benefited from 1% year-over-year customer growth. We think Laclede remains on track for earnings per share of $3.40 in 2016.

The company should do well in the years ahead. Results are likely to show the most improvement in the second half of the year, as costs will probably ease. Notably, the warmer winter weather allowed for system reliability checks. This development should lower overtime costs in the quarters ahead. Laclede stands to benefit from increases in system reliability and the replacement of older portions of the Missouri Gas pipeline system. This should allow share earnings to expand to $3.60 in 2017.

A new pipeline may be in the works for Laclede. The company expects to build a pipeline from western Illinois, allowing for cheaper natural gas to reach its Missouri customers. This project would have a total cost of between $170 million and $200 million. Though a deal has not been formalized, management expects to partner with established pipeline companies to build the diversion. Given that pipelines generally have higher allowable rates than utilities, and that natural gas transportation costs would be lower, we think the move will significantly boost share-net growth in the years ahead.

Shares of Laclede Group appear to be fully valued at the recent quotation. The share price has jumped and is now trading inside of our long-term Target Price Range. Meanwhile, the yield does not stand out when compared to others in the industry. Still, these shares maintain a solid and growing payout, which remains well covered by earnings. Though conservative income investors may find some appeal here, long-term accounts would be best served waiting until a more favorable purchasing opportunity arises.

John E. Seibert III *March 4, 2016*

(A) Fiscal year ends Sept. 30th. (B) Based on diluted shares outstanding. Excludes nonrecurring loss: '06, 7¢. Excludes gain from discontinued operations: '08, 94¢. Next earnings report due late April. (C) Dividends historically paid in early January, April, July, and October. ■ Dividend reinvestment plan available. (D) Incl. deferred charges. In '14: $383.8 mill., $8.85/sh. (E) In millions. (F) Qtly. egs. may not sum due to rounding or change in shares outstanding.

Company's Financial Strength	B++
Stock's Price Stability	100
Price Growth Persistence	40
Earnings Predictability	80

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NEW JERSEY RES. NYSE-NJR

RECENT PRICE 34.29 | P/E RATIO 21.4 (Trailing: 20.1 / Median: 16.0) | RELATIVE P/E RATIO 1.27 | DIV'D YLD 2.8% | VALUE LINE

TIMELINESS 3 Lowered 10/31/14
SAFETY 1 Raised 9/15/06
TECHNICAL 2 Raised 3/4/16
BETA .80 (1.00 = Market)

High:	16.4	17.7	18.8	20.6	21.2	22.0	25.2	25.1	23.8	32.1	34.1	36.6
Low:	13.6	13.8	15.2	12.3	15.0	16.7	19.8	19.3	19.5	21.9	26.8	32.3

Target Price Range 2019 | 2020 | 2021

2019-21 PROJECTIONS

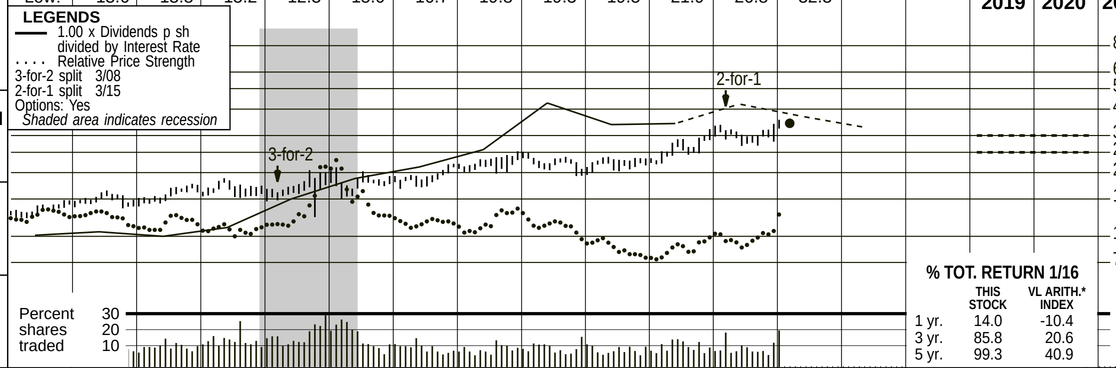
	Price	Gain	Ann'l Total Return
High	30	(-15%)	Nil
Low	25	(-25%)	-4%

Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	0	0	0	0	0
Options	0	0	0	0	0	0	7	6	7
to Sell	0	0	0	0	0	0	0	0	0

Institutional Decisions

	1Q2015	2Q2015	3Q2015
to Buy	117	103	105
to Sell	96	113	103
Hld's(000)	51597	50230	49793



% TOT. RETURN 1/16

	THIS STOCK	VL ARITH.* INDEX
1 yr.	14.0	-10.4
3 yr.	85.8	20.6
5 yr.	99.3	40.9

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	© VALUE LINE PUB. LLC	19-21
14.71	25.61	22.06	31.14	30.44	38.10	39.81	36.31	45.37	31.17	32.05	36.30	27.08	38.38	44.40	32.09	*30.30*	*35.30*	Revenues per sh A	*38.55*
1.00	1.06	1.07	1.19	1.25	1.31	1.37	1.22	1.81	1.58	1.63	1.70	1.86	1.93	2.73	*2.50*	*2.35*	*2.60*	"Cash Flow" per sh	*2.70*
.60	.65	.70	.79	.85	.88	.93	.78	1.35	1.20	1.23	1.29	1.36	1.37	2.08	1.78	*1.60*	*1.80*	Earnings per sh B	*1.90*
.38	.39	.40	.41	.43	.45	.48	.51	.56	.62	.68	.72	.77	.81	.86	.93	*.96*	*.98*	Div'ds Decl'd per sh C■	*1.02*
.62	.55	.51	.57	.72	.64	.64	.73	.86	.90	1.05	1.13	1.26	1.33	1.52	1.65	*1.70*	*1.75*	Cap'l Spending per sh	*1.80*
4.14	4.40	4.35	5.13	5.62	5.30	7.50	7.75	8.64	8.29	8.81	9.36	9.80	10.65	11.48	12.99	*13.60*	*14.45*	Book Value per sh D	*16.90*
79.17	79.99	83.00	81.70	83.22	82.64	82.88	83.22	84.12	83.17	82.35	82.89	83.05	83.32	84.20	85.19	*85.00*	*85.00*	Common Shs Outst'g E	*85.00*
14.7	14.2	14.7	14.0	15.3	16.8	16.1	21.6	12.3	14.9	15.0	16.8	16.8	16.0	11.7	16.6	*Bold figures are*		Avg Ann'l P/E Ratio	*14.0*
.96	.73	.80	.80	.81	.89	.87	1.15	.74	.99	.95	1.05	1.07	.90	.62	.91	*Value Line*		Relative P/E Ratio	*.90*
4.4%	4.2%	3.9%	3.7%	3.3%	3.1%	3.2%	3.0%	3.3%	3.5%	3.7%	3.3%	3.4%	3.7%	3.5%	3.1%	*estimates*		Avg Ann'l Div'd Yield	*3.5%*

CAPITAL STRUCTURE as of 12/31/15
Total Debt $1070.2 mill. **Due in 5 Yrs** $321.9 mill.
LT Debt $848.2 mill. **LT Interest** $25.4 mill.
Incl. $53.2 mill. capitalized leases.
(LT interest earned: 7.5x; total interest coverage: 7.5x)
Pension Assets-9/15 $256.4 mill. **Oblig.** $394.4 mill.
Pfd Stock None

Common Stock 85,923,516 shs.
as of 2/1/16
MARKET CAP: $2.9 billion (Mid Cap)

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		19-21
3299.6	3021.8	3816.2	2592.5	2639.3	3009.2	2248.9	3198.1	3738.1	2734.0	*2575*	*3000*	Revenues ($mill) A	*3280*
78.5	65.3	113.9	101.0	101.8	106.5	112.4	113.7	176.9	151.5	*135*	*155*	Net Profit ($mill)	*165*
38.9%	38.8%	37.8%	27.1%	41.4%	30.2%	7.1%	25.4%	30.2%	*32.0%*	*32.0%*	*32.0%*	Income Tax Rate	*32.0%*
2.4%	2.2%	3.0%	3.9%	3.9%	3.5%	5.0%	3.6%	4.7%	5.5%	*5.3%*	*5.2%*	Net Profit Margin	*5.0%*
34.8%	37.3%	38.5%	39.8%	37.2%	35.5%	39.2%	36.6%	38.2%	43.2%	*43.5%*	*43.5%*	Long-Term Debt Ratio	*41.0%*
65.2%	62.7%	61.5%	60.2%	62.8%	64.5%	60.8%	63.4%	61.8%	56.8%	*56.5%*	*56.5%*	Common Equity Ratio	*59.0%*
954.0	1028.0	1182.1	1144.8	1154.4	1203.1	1339.0	1400.3	1564.4	1950.6	*2060*	*2215*	Total Capital ($mill)	*2435*
934.9	970.9	1017.3	1064.4	1135.7	1295.9	1484.9	1643.1	1884.1	2128.3	*2170*	*2215*	Net Plant ($mill)	*2350*
9.6%	7.7%	10.7%	9.7%	9.7%	9.7%	9.2%	9.0%	12.1%	*8.5%*	*8.0%*	*8.0%*	Return on Total Cap'l	*8.0%*
12.6%	10.1%	15.7%	14.6%	14.0%	13.7%	13.8%	12.8%	18.3%	*13.7%*	*12.0%*	*12.5%*	Return on Shr. Equity	*11.5%*
12.6%	10.1%	15.7%	14.6%	14.0%	13.7%	13.8%	12.8%	18.3%	13.7%	*12.0%*	*12.5%*	Return on Com Equity	*11.5%*
6.3%	3.6%	9.5%	7.2%	6.7%	6.2%	6.2%	5.2%	11.0%	6.8%	*5.0%*	*6.0%*	Retained to Com Eq	*5.0%*
50%	64%	40%	50%	52%	55%	55%	59%	40%	51%	*60%*	*54%*	All Div'ds to Net Prof	*53%*

CURRENT POSITION ($MILL.)	2014	2015	12/31/15
Cash Assets	2.2	4.9	1.7
Other	680.5	539.6	539.6
Current Assets	682.7	544.5	587.2
Accts Payable	330.3	273.2	235.7
Debt Due	335.5	77.5	222.0
Other	125.3	85.4	117.2
Current Liab.	791.1	436.1	574.9
Fix. Chg. Cov.	1007%	750%	750%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '12-'14 to '19-'21
Revenues	3.0%	-.5%	*NMF*
"Cash Flow"	6.5%	7.0%	*2.0%*
Earnings	7.5%	7.5%	*1.5%*
Dividends	7.0%	7.5%	*3.0%*
Book Value	8.0%	5.5%	*6.5%*

Fiscal Year Ends	QUARTERLY REVENUES ($ mill.) A Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2013	736.0	960.9	767.5	733.7	3198.1
2014	878.4	1579.6	688.3	591.9	3738.2
2015	824.1	1013.1	458.5	438.3	2734.0
2016	444.3	*1085*	*525*	*520.7*	*2575*
2017	*550*	*1190*	*635*	*625*	*3000*

Fiscal Year Ends	EARNINGS PER SHARE A B Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2013	.43	.82	.12	d.01	1.37
2014	.47	1.81	.05	d.23	2.10
2015	.65	1.16	.03	d.06	1.78
2016	.58	*1.13*	*.01*	*d.12*	*1.60*
2017	*.63*	*1.18*	*.06*	*d.07*	*1.80*

Cal-endar	QUARTERLY DIVIDENDS PAID C ■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	.19	.19	.19	.40	.97
2013	- -	.20	.20	.20	.60
2014	.21	.21	.21	.23	.86
2015	.23	.23	.23	.24	.93
2016	.24				

BUSINESS: New Jersey Resources Corp. is a holding company providing retail/wholesale energy svcs. to customers in New Jersey, and in states from the Gulf Coast to New England, and Canada. New Jersey Natural Gas had about 512,300 customers at 9/30/15 in Monmouth and Ocean Counties, and other N.J. Counties. Fiscal 2015 volume: 341 bill. cu. ft. (14% interruptible, 21% residential and commercial and electric utility, 65% incentive programs). N.J. Natural Energy subsidiary provides unregulated retail/wholesale natural gas and related energy svcs. 2015 dep. rate: 2.5%. Has 991 empls. Off./dir. own about 1.4% of common (12/15 Proxy). Chrmn., CEO & Pres.: Laurence M. Downes. Inc.: NJ Addr.: 1415 Wyckoff Road, Wall, NJ 07719. Tel.: 732-938-1480. Web: www.njresources.com.

New Jersey Resources is off to a difficult start this fiscal year (began October 1st). Indeed, revenues fell roughly 46% on a year-over-year basis, due to sharply lower natural gas distribution and energy service volumes. However, this can be largely viewed as a technicality owing to declining natural gas prices as commodities continue to slip. NJR's overall number of customer meters and system throughput continue to climb. In fact, the NJNG unit added 2,046 new customer accounts during the first quarter. On the profitability front, total operating expenses rose 710 basis points as a percentage of the top line. All told, the first-quarter bottom line fell about 11%, to $0.58 a share. This was $0.04 below our earlier call, and has prompted us to trim a nickel off our 2016 earnings estimate, to $1.60 a share. The remainder of the year will likely reflect the depressed commodity prices owing to the glut of supply on the markets as well as the warmer-than-normal weather patterns.

Meanwhile, we have introduced our 2017 top- and bottom-line estimates at $3.0 billion and $1.80 a share, respectively. NJR continues to focus on expanding its network through growth projects, boosting system reliability, integrity, and capacity. The New Jersey based utility provider is also raising its exposure to green initiatives through solar and wind projects. At the same time, the NJNG division is anticipating adding 24,000 to 28,000 new customers over the next three years. These efforts should help to turn things around for NJR.

The financial position deteriorated a bit during the first quarter. Cash reserves declined more than 65% over that time frame, to about $1.7 billion, which is relatively low compared to NJR's historical levels. Meanwhile, the long-term debt load has remained pretty stable versus 2015's figure, but is near the higher end of the company's spectrum when viewed against the past five or 10 years.

At this juncture, we think most investor funds could be better utilized elsewhere. Shares of NJR are trading somewhat above our Target Price Range, thus suggesting a lack of capital appreciation potential for the pull to 2019-2021.

Bryan J. Fong *March 4, 2016*

(A) Fiscal year ends Sept. 30th.
(B) Diluted earnings. Qtly egs may not sum to total due to change in shares outstanding. Next earnings report due late April.
(C) Dividends historically paid in early Jan., April, July, and October. 1Q '13 div'd paid in 4Q '12. ■ Dividend reinvestment plan available.
(D) Includes regulatory assets in 2015: $410.2 million, $4.82/share.
(E) In millions, adjusted for splits.

Company's Financial Strength	A+
Stock's Price Stability	85
Price Growth Persistence	55
Earnings Predictability	60

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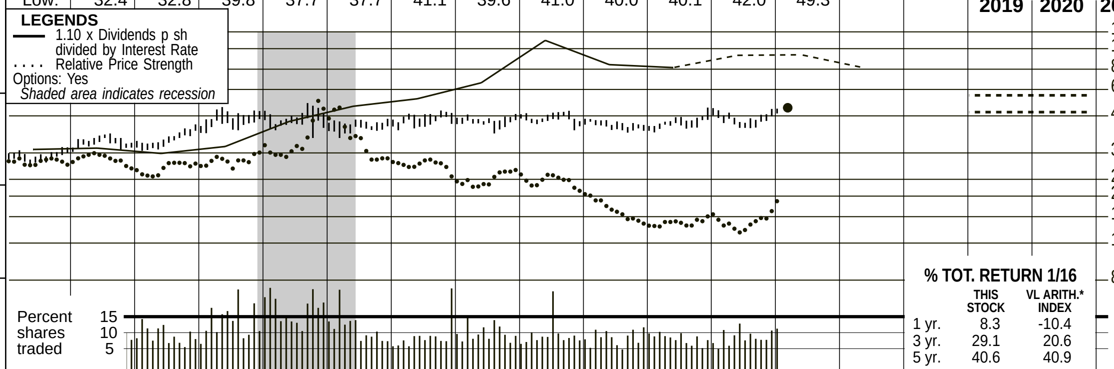
N.W. NAT'L GAS NYSE-NWN

RECENT PRICE **52.35** | P/E RATIO **24.0** (Trailing: 26.7 / Median: 18.0) | RELATIVE P/E RATIO **1.42** | DIV'D YLD **3.6%** | **VALUE LINE**

TIMELINESS 3 Raised 12/4/15
SAFETY 1 Raised 3/18/05
TECHNICAL 2 Raised 3/4/16
BETA .65 (1.00 = Market)

High:	39.6	43.7	52.8	55.2	46.5	50.9	49.0	50.8	46.6	52.6	52.3	53.5
Low:	32.4	32.8	39.8	37.7	37.7	41.1	39.6	41.0	40.0	40.1	42.0	49.3



2019-21 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	60	(+15%)	7%
Low	50	(-5%)	3%

Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	0	0	0	0	0
Options	0	0	1	0	0	0	0	3	0
to Sell	1	0	1	0	0	0	0	4	1

Institutional Decisions

	1Q2015	2Q2015	3Q2015
to Buy	93	80	69
to Sell	55	76	74
Hld's(000)	17253	16711	16793

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	© VALUE LINE PUB. LLC	19-21
21.09	25.78	25.07	23.57	25.69	33.01	37.20	39.13	39.16	38.17	30.56	31.72	27.14	28.02	27.64	*26.39*	*28.10*	*29.30*	Revenues per sh	*31.80*
3.68	3.86	3.65	3.85	3.92	4.34	4.76	5.41	5.31	5.20	5.18	5.00	4.94	5.04	5.05	*4.90*	*5.00*	*5.30*	"Cash Flow" per sh	*6.35*
1.79	1.88	1.62	1.76	1.86	2.11	2.35	2.76	2.57	2.83	2.73	2.39	2.22	2.24	2.16	1.96	*2.20*	*2.35*	Earnings per sh A	*3.15*
1.24	1.25	1.26	1.27	1.30	1.32	1.39	1.44	1.52	1.60	1.68	1.75	1.79	1.83	1.85	1.86	*1.87*	*1.91*	Div'ds Decl'd per sh B■	*2.05*
3.46	3.23	3.11	4.90	5.52	3.48	3.56	4.48	3.92	5.09	9.35	3.76	4.91	5.13	4.40	*5.80*	*6.15*	*6.45*	Cap'l Spending per sh	*6.80*
17.93	18.56	18.88	19.52	20.64	21.28	22.01	22.52	23.71	24.88	26.08	26.70	27.23	27.77	28.12	*28.47*	*29.85*	*30.95*	Book Value per sh D	*35.40*
25.23	25.23	25.59	25.94	27.55	27.58	27.24	26.41	26.50	26.53	26.58	26.76	26.92	27.08	27.28	*27.42*	*27.75*	*28.00*	Common Shs Outst'g C	*28.00*
12.4	12.9	17.2	15.8	16.7	17.0	15.9	16.7	18.1	15.2	17.0	19.0	21.1	19.4	20.7	23.7	*Bold figures are*		Avg Ann'l P/E Ratio	*17.0*
.81	.66	.94	.90	.88	.91	.86	.89	1.09	1.01	1.08	1.19	1.34	1.09	1.09	1.20	*Value Line*		Relative P/E Ratio	*1.05*
5.6%	5.1%	4.5%	4.6%	4.2%	3.7%	3.7%	3.1%	3.3%	3.7%	3.6%	3.9%	3.8%	4.2%	4.1%	4.0%	*estimates*		Avg Ann'l Div'd Yield	*3.7%*

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		19-21
1013.2	1033.2	1037.9	1012.7	812.1	848.8	730.6	758.5	754.0	723.8	*780*	*820*	Revenues ($mill)	*890*
65.2	74.5	68.5	75.1	72.7	63.9	59.9	60.5	58.7	53.7	*61.0*	*65.0*	Net Profit ($mill)	*88.0*
36.3%	37.2%	36.9%	38.3%	40.5%	40.4%	42.4%	40.8%	41.5%	*40.0%*	*40.0%*	*39.0%*	Income Tax Rate	*39.0%*
6.4%	7.2%	6.6%	7.4%	8.9%	7.5%	8.2%	8.0%	7.8%	7.4%	*7.8%*	*8.0%*	Net Profit Margin	*9.9%*
46.3%	46.3%	44.9%	47.7%	46.1%	47.3%	48.5%	47.6%	44.8%	*42.4%*	*44.5%*	*44.5%*	Long-Term Debt Ratio	*43.5%*
53.7%	53.7%	55.1%	52.3%	53.9%	52.7%	51.5%	52.4%	55.2%	*57.6%*	*55.5%*	*55.5%*	Common Equity Ratio	*56.5%*
1116.5	1106.8	1140.4	1261.8	1284.8	1356.2	1424.7	1433.6	1389.0	*1357.6*	*1495*	*1555*	Total Capital ($mill)	*1755*
1425.1	1495.9	1549.1	1670.1	1854.2	1893.9	1973.6	2062.9	2121.6	*2182.7*	*2295*	*2385*	Net Plant ($mill)	*2685*
7.1%	8.5%	7.7%	7.3%	7.0%	6.2%	5.7%	5.8%	5.8%	*4.0%*	*5.5%*	*5.5%*	Return on Total Cap'l	*6.0%*
10.9%	12.5%	10.9%	11.4%	10.5%	8.9%	8.2%	8.1%	7.6%	*6.9%*	*7.5%*	*7.5%*	Return on Shr. Equity	*9.0%*
10.9%	12.5%	10.9%	11.4%	10.5%	8.9%	8.2%	8.1%	7.6%	*6.9%*	*7.5%*	*7.5%*	Return on Com Equity	*9.0%*
4.5%	6.0%	4.5%	5.0%	4.0%	2.4%	1.6%	1.5%	1.1%	*.4%*	*1.0%*	*1.5%*	Retained to Com Eq	*3.0%*
59%	52%	59%	56%	61%	73%	80%	81%	85%	*95%*	*85%*	*81%*	All Div'ds to Net Prof	*65%*

CAPITAL STRUCTURE as of 9/30/15
Total Debt $846.9 mill. **Due in 5 Yrs** $360.0 mill.
LT Debt $621.7 mill. **LT Interest** $45.0 mill.

(Total interest coverage: 3.0x)

Pension Assets-12/14 $279.2 mill. **Oblig.** $487.3 mill.

Pfd Stock None

Common Stock 27,371,642 shares
as of 10/23/15

MARKET CAP $1.4 billion (Mid Cap)

CURRENT POSITION ($MILL.)	2013	2014	9/30/15
Cash Assets	9.5	9.5	5.2
Other	321.0	353.1	272.7
Current Assets	330.5	362.6	277.9
Accts Payable	96.1	91.4	54.4
Debt Due	248.2	274.7	225.2
Other	88.5	103.3	105.7
Current Liab.	432.8	469.4	385.3
Fix. Chg. Cov.	316%	321%	298%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '12-'14 to '19-'21
Revenues	1.0%	-6.5%	2.0%
"Cash Flow"	3.0%	-1.0%	3.5%
Earnings	2.5%	-4.0%	5.0%
Dividends	3.5%	3.5%	1.5%
Book Value	3.5%	3.0%	3.5%

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	277.9	131.7	88.2	260.7	758.5
2014	293.4	133.1	87.2	240.3	754.0
2015	261.7	138.3	93.1	230.7	723.8
2016	*270*	*145*	*95.0*	*270*	*780*
2017	*280*	*155*	*100*	*285*	*820*

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	1.40	.08	d.31	1.07	2.24
2014	1.40	.04	d.32	1.04	2.16
2015	1.04	.08	d.24	1.08	1.96
2016	*1.20*	*.10*	*d.20*	*1.10*	*2.20*
2017	*1.25*	*.15*	*d.20*	*1.15*	*2.35*

Cal-endar	QUARTERLY DIVIDENDS PAID B ■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	.445	.445	.445	.455	1.79
2013	.455	.455	.455	.460	1.83
2014	.460	.460	.460	.465	1.85
2015	.465	.465	.465	.4675	1.86
2016	.4675				

BUSINESS: Northwest Natural Gas Co. distributes natural gas to 90 communities, 704,000 customers, in Oregon (89% of customers) and in southwest Washington state. Principal cities served: Portland and Eugene, OR; Vancouver, WA. Service area population: 2.5 mill. (77% in OR). Company buys gas supply from Canadian and U.S. producers; has transportation rights on Northwest Pipeline system. Owns local underground storage. Rev. breakdown: residential, 35%; commercial, 22%; industrial, gas transportation, and other, 43%. Employs 1,092. BlackRock Inc. owns 9.2% of shares; officers and directors, 2.1% (4/15 proxy). CEO: Gregg S. Kantor. Inc.: Oregon. Address: 220 NW 2nd Ave., Portland, OR 97209. Telephone: 503-226-4211. Internet: www.nwnatural.com.

Northwest Natural Gas had better-than-expected fourth-quarter results. The Portland area had weather that was slightly cooler than the year-prior period, which helped to boost throughput at utility segment. In addition, a 1.4% customer growth rate and an increase in gas margins allowed earnings per share to grow 3%, to $1.08. The company was able to overcome a $3.5 million, non-cash environmental remediation charge, as well.

Northwest Natural Gas received an unfavorable outcome concerning expense recoveries. It was ordered to forgo the collection of $15 million of environmental remediation expenses and related interest costs. This will result in a $2.8 million pretax charge in the first quarter of 2016. Still, stronger operating margins should more than offset this setback. All told, we think the company can earn $2.20 a share in 2016.

Northwest Natural Gas announced that CEO, Gregg Kantor, will step down effective August 1st. However, he will stay in an advisory role until the end of 2016. The current COO, David Anderson, will succeed Mr. Kantor. Though we expect no immediate change in strategy, it will be interesting to see what, if any, changes ultimately emerge.

The Mist storage facility should boost long-term results. The company is expected to put the facility into service in the winter of 2018-2019, which should allow for better natural gas sales over the coming years. This move will cost around $125 million and, in time, provide a benefit to cash flows.

The dividend remains the main draw. It was raised to $0.4675 a share quarterly, and has been increased 60 years in a row. We think Northwest remains likely to continue this uptrend over the coming years, though it appears likely at a lower growth rate than during the previous decade until the Mist facility comes on line.

Shares of Northwest Natural Gas are not attractive at the recent quotation. Indeed, a recent run-up in the share price has put the shares near the middle of our Target Price Range. This has made the yield less attractive, and most long-term accounts would be best served waiting for a dip in price.

John E. Seibert III *March 4, 2016*

(A) Diluted earnings per share. Excludes nonrecurring items: '00, $0.11; '06, ($0.06); '08, ($0.03); '09, 6¢; May not sum due to rounding. Next earnings report due in early May.
(B) Dividends historically paid in mid-February, May, August, and November.
■ Dividend reinvestment plan available.
(C) In millions.
(D) Includes intangibles. In 2014: $368.9 million, $13.52/share.

Company's Financial Strength	A
Stock's Price Stability	100
Price Growth Persistence	30
Earnings Predictability	95

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SOUTH JERSEY INDS. NYSE-SJI

RECENT PRICE	P/E RATIO		RELATIVE P/E RATIO	DIV'D YLD	
26.48	16.4	(Trailing: 20.6 Median: 17.0)	0.97	4.1%	VALUE LINE

TIMELINESS 3 Raised 2/19/16

SAFETY 2 Lowered 1/4/91

TECHNICAL 5 Lowered 1/8/16

BETA .85 (1.00 = Market)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
High:	16.2	17.1	20.6	20.3	20.4	27.1	29.0	29.0	31.1	30.6	30.4	26.9	
Low:	12.5	12.8	15.6	12.6	16.0	18.6	21.4	22.9	25.3	25.9	21.2	22.1	

Target Price Range

2019	2020	2021

2019-21 PROJECTIONS

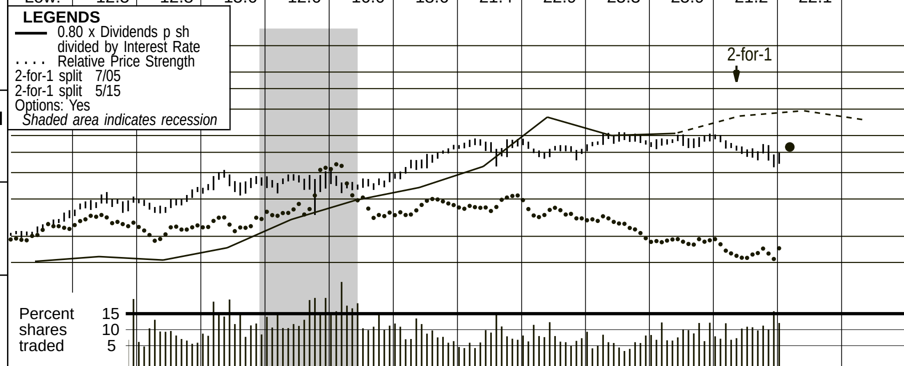
	Price	Gain	Ann'l Total Return
High	40	(+50%)	15%
Low	30	(+15%)	8%

Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	1	0	0	0	0
Options	0	0	0	0	0	0	0	0	0
to Sell	2	1	2	1	0	0	0	0	0

Institutional Decisions

	1Q2015	2Q2015	3Q2015
to Buy	107	83	105
to Sell	64	79	59
Hld's(000)	40934	42248	42947



% TOT. RETURN 1/16

	THIS STOCK	VL ARITH.* INDEX
1 yr.	-11.0	-10.4
3 yr.	2.0	20.6
5 yr.	12.5	40.9

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	© VALUE LINE PUB. LLC	19-21
11.22	17.65	10.35	13.17	14.75	15.89	15.88	16.15	16.18	14.19	15.48	13.71	11.16	11.18	12.98	**14.15**	**14.60**	**15.20**	Revenues per sh	**18.60**
.97	.95	1.06	1.12	1.22	1.25	1.75	1.60	1.74	1.86	2.10	2.23	2.34	2.48	2.67	**2.50**	**2.65**	**2.85**	"Cash Flow" per sh	**3.55**
.54	.57	.61	.68	.79	.86	1.23	1.05	1.14	1.19	1.35	1.45	1.52	1.52	1.57	**1.48**	**1.60**	**1.75**	Earnings per sh A	**2.20**
.37	.37	.38	.39	.41	.43	.46	.51	.56	.61	.68	.75	.83	.90	.96	1.02	**1.08**	**1.15**	Div'ds Decl'd per sh B ■	**1.40**
1.11	1.41	1.74	1.18	1.34	1.60	1.26	.94	1.04	1.83	2.79	3.20	4.01	4.84	5.01	**4.45**	**4.65**	**4.85**	Cap'l Spending per sh	**5.75**
3.62	3.91	4.84	5.63	6.20	6.75	7.55	8.12	8.67	9.12	9.54	10.33	11.63	12.64	13.65	**14.30**	**15.30**	**16.20**	Book Value per sh C	**18.60**
46.00	47.44	48.83	52.92	55.52	57.96	58.65	59.22	59.46	59.59	59.75	60.43	63.31	65.43	68.33	**70.00**	**72.00**	**74.00**	Common Shs Outst'g D	**78.00**
13.0	13.6	13.5	13.3	14.1	16.6	11.9	17.2	15.9	15.0	16.8	18.4	16.9	18.9	18.0	**17.5**	*Bold figures are*		Avg Ann'l P/E Ratio	**16.0**
.85	.70	.74	.76	.74	.88	.64	.91	.96	1.00	1.07	1.15	1.08	1.06	.95	**.89**	*Value Line*		Relative P/E Ratio	**1.00**
5.2%	4.7%	4.6%	4.3%	3.7%	3.0%	3.2%	2.8%	3.1%	3.4%	3.0%	2.8%	3.2%	3.1%	3.4%	4.0%	*estimates*		Avg Ann'l Div'd Yield	**4.0%**

CAPITAL STRUCTURE as of 9/30/15
Total Debt $1366.7 mill. **Due in 5 Yrs** $868.5 mill.
LT Debt $937.4 mill. **LT Interest** $22.0 mill.
(Total interest coverage: 4.0x)

Leases, Uncapitalized Annual rentals $.7 mill.
Pension Assets-12/14 $180.5 mill. **Oblig.** $265.4 mill.

Pfd Stock None

Common Stock 69,294,447 shs. **as of 11/2/15, adj. for 2-for-1 split**

MARKET CAP: $1.8 billion (Mid Cap)

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		19-21
931.4	956.4	962.0	845.4	925.1	828.6	706.3	731.4	887.0	**990**	**1050**	**1125**	Revenues ($mill)	**1450**
72.0	61.8	67.7	71.3	81.0	87.0	93.3	97.1	104.0	**105**	**115**	**130**	Net Profit ($mill)	**170**
41.3%	41.9%	47.7%	23.0%	15.2%	22.4%	10.8%	- -	10.8%	**20.0%**	**22.0%**	**22.0%**	Income Tax Rate	**25.0%**
7.7%	6.5%	7.0%	8.4%	8.8%	10.5%	13.2%	13.3%	11.7%	**10.6%**	**11.0%**	**11.6%**	Net Profit Margin	**11.7%**
44.7%	42.7%	39.2%	36.5%	37.4%	40.5%	45.0%	45.1%	48.0%	**48.5%**	**49.0%**	**48.5%**	Long-Term Debt Ratio	**47.5%**
55.3%	57.3%	60.8%	63.5%	62.6%	59.5%	55.0%	54.9%	52.0%	**51.5%**	**51.0%**	**51.5%**	Common Equity Ratio	**52.5%**
801.1	839.0	848.0	856.4	910.1	1048.3	1337.6	1507.4	1791.9	**1950**	**2150**	**2325**	Total Capital ($mill)	**2775**
920.0	948.9	982.6	1073.1	1193.3	1352.4	1578.0	1859.1	2134.1	**2350**	**2450**	**2550**	Net Plant ($mill)	**2900**
10.1%	8.6%	8.9%	9.0%	9.5%	8.9%	7.4%	6.8%	6.4%	**6.0%**	**6.0%**	**6.0%**	Return on Total Cap'l	**6.5%**
16.3%	12.8%	13.1%	13.1%	14.2%	13.9%	12.7%	11.7%	11.2%	**10.5%**	**10.5%**	**11.0%**	Return on Shr. Equity	**11.5%**
16.3%	12.8%	13.1%	13.1%	14.2%	13.9%	12.7%	11.7%	11.2%	**10.5%**	**10.5%**	**11.0%**	Return on Com Equity	**11.5%**
10.2%	6.7%	6.7%	6.4%	7.1%	6.7%	5.8%	4.8%	4.3%	**3.5%**	**3.5%**	**3.5%**	Retained to Com Eq	**4.0%**
37%	48%	49%	51%	50%	52%	55%	59%	61%	**68%**	**68%**	**65%**	All Div'ds to Net Prof	**64%**

CURRENT POSITION ($MILL.)	2013	2014	9/30/15
Cash Assets	3.8	4.2	2.1
Other	479.1	562.5	476.8
Current Assets	482.9	566.7	478.9
Accts Payable	259.8	273.0	189.1
Debt Due	374.9	395.6	429.3
Other	130.3	181.6	188.6
Current Liab.	765.0	850.2	807.0
Fix. Chg. Cov.	370%	432%	475%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '12-'14 to '19-'21
Revenues	-1.0%	-5.5%	*7.0%*
"Cash Flow"	8.0%	7.5%	*5.0%*
Earnings	8.0%	6.5%	*5.5%*
Dividends	8.5%	10.0%	*6.5%*
Book Value	8.5%	8.0%	*5.5%*

Cal-endar	QUARTERLY REVENUES ($ mill.) Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	255.6	122.6	128.8	224.4	731.4
2014	350.2	133.3	122.4	281.1	887.0
2015	383.0	177.7	141.1	***288.2***	***990***
2016	***405***	***175***	***155***	***315***	***1050***
2017	***430***	***190***	***165***	***340***	***1125***

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	.76	.16	d.02	.62	1.52
2014	1.01	.15	d.05	.47	1.57
2015	.86	.03	d.07	***.66***	***1.48***
2016	***.90***	***.05***	***Nil***	***.65***	***1.60***
2017	***.95***	***.08***	***.02***	***.70***	***1.75***

Cal-endar	QUARTERLY DIVIDENDS PAID B■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	- -	.202	.202	.423	.83
2013	- -	.222	.222	.458	.90
2014	- -	.237	.237	.488	.96
2015	- -	.251	.251	.515	1.02
2016					

BUSINESS: South Jersey Industries, Inc. is a holding company. Its subsidiary, South Jersey Gas Co., distributes natural gas to 366,854 customers in New Jersey's southern counties. Gas revenue mix '14: residential, 43%; commercial, 19%; cogeneration and electric generation, 17%; industrial, 21%. Non-utility operations include: South Jersey Energy, South Jersey Resources Group, South Jersey Exploration, Marina Energy, South Jersey Energy Service Plus, and SJI Midstream. Has about 700 employees. Off./dir. own .8% of common shares; BlackRock, Inc., 9.5%; The Vanguard Group, Inc., 6.9% (3/15 proxy). Pres. & CEO: Michael J. Renna. Inc.: NJ. Address: 1 South Jersey Plaza, Folsom, NJ 08037. Tel.: 609-561-9000. Internet: www.sjindustries.com.

Shares of South Jersey Industries have traded higher over the past three months. We think that weakness in the broader equity markets has encouraged investors to seek relatively safe alternatives. Also, the stock had been trading near a multiyear low three months ago. Despite strong top-line performance in the first three quarters of 2015, greater costs have made for lackluster earnings. However, we do expect a more favorable bottom-line comparison for the fourth quarter. The company was set to report December-period results as this Issue went to press.

The board of directors has increased the payout by 5%. Starting with the December payout, the quarterly dividend is now $0.264. Dividend growth will probably continue in the coming years.

We expect a strong performance from the company's core businesses going forward. Prospects for utility South Jersey Gas appear favorable. Natural gas remains the fuel of choice within its service territory. All in all, we expect customer additions and infrastructure investment to drive earnings higher here. Elsewhere, the company's nonutility operations should also perform well overall. South Jersey Energy Group's earnings ought to gain from an increasing contribution from fuel supply management contracts. Additional announced contracts are scheduled to come on-line in 2016 and 2017. Over the long haul, we expect strong contributions from the company's commodity marketing and fuel supply management lines. This, along with expected benefits from the Penn East pipeline, ought to drive bottom-line growth and improve earnings quality.

Conservative investors with a long time horizon may find something to like here. This equity offers good risk-adjusted total return potential for the pull to late decade. This should be supported by healthy growth at the company in the coming years. The dividend yield remains attractive, despite the recent appreciation in the share price. South Jersey earns good marks for Safety, Financial Strength, Price Stability, and Earnings Predictability. Also, volatility is below average (Beta: 0.85). This stock is neutrally ranked for year-ahead performance.

Michael Napoli, CFA *March 4, 2016*

(A) Based on GAAP egs. through 2006, economic egs. thereafter. GAAP EPS: '07, $1.05; '08, $1.29; '09, $0.97; '10, $1.11; '11, $1.49; '12, $1.49; '13, $1.28; '14, $1.46. Excl. nonrecur. gain (loss): '01, $0.07; '08, $0.16; '09, ($0.22); '10, ($0.24); '11, $0.04; '12, ($0.03); '13, ($0.24); '14, ($0.11). Earnings may not sum due to rounding. Next egs. report due early May. (B) Div'ds paid early April, July, Oct., and late Dec. ■ Div. reinvest. plan avail. (C) Incl. reg. assets. In 2014: $357.2 mill., $5.23 per shr. (D) In mill., adj. for split.

Company's Financial Strength	A
Stock's Price Stability	90
Price Growth Persistence	50
Earnings Predictability	80

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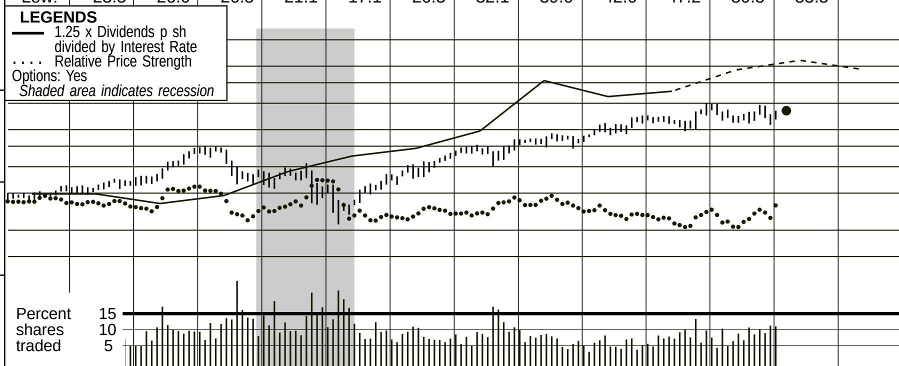
RECENT PRICE 59.05 | P/E RATIO 18.9 (Trailing: 21.2 Median: 16.0) | RELATIVE P/E RATIO 1.12 | DIV'D YLD 3.0% | VALUE LINE

TIMELINESS 2 Raised 3/4/16
SAFETY 3 Lowered 1/4/91
TECHNICAL 2 Raised 3/4/16
BETA .80 (1.00 = Market)

High:	28.1	39.4	39.9	33.3	29.5	37.3	43.2	46.1	56.0	64.2	63.7	60.7
Low:	23.5	26.0	26.5	21.1	17.1	26.3	32.1	39.0	42.0	47.2	50.5	53.5

Target Price Range 2019 | 2020 | 2021

LEGENDS
— 1.25 x Dividends p sh divided by Interest Rate
.... Relative Price Strength
Options: Yes
Shaded area indicates recession



2019-21 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	85	(+45%)	12%
Low	60	(Nil)	4%

Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	0	0	0	0	0
Options	0	0	0	0	0	1	0	2	1
to Sell	0	0	0	0	3	0	0	2	1

Institutional Decisions

	1Q2015	2Q2015	3Q2015
to Buy	94	109	109
to Sell	81	80	84
Hld's(000)	36094	36799	37243

Percent shares traded 15 10 5

% TOT. RETURN 1/16

	THIS STOCK	VL ARITH.* INDEX
1 yr.	-1.5	-10.4
3 yr.	43.3	20.6
5 yr.	81.0	40.9

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	© VALUE LINE PUB. LLC	19-21
32.61	42.98	39.68	35.96	40.14	43.59	48.47	50.28	48.53	42.00	40.18	41.07	41.77	42.08	45.61	52.00	***51.55***	***53.00***	Revenues per sh	***58.50***
4.57	4.79	5.07	5.11	5.57	5.20	5.97	6.21	5.76	6.16	6.46	6.81	7.73	8.24	8.47	8.62	***9.00***	***9.50***	"Cash Flow" per sh	***11.60***
1.21	1.15	1.16	1.13	1.66	1.25	1.98	1.95	1.39	1.94	2.27	2.43	2.86	3.11	3.01	2.92	***3.20***	***3.50***	Earnings per sh A	***4.80***
.82	.82	.82	.82	.82	.82	.82	.86	.90	.95	1.00	1.06	1.18	1.32	1.46	1.62	***1.80***	***1.92***	Div'ds Decl'd per sh B■†	***2.30***
7.04	8.17	8.50	7.03	8.23	7.49	8.27	7.96	6.79	4.81	4.73	8.29	8.57	7.86	8.53	10.30	***9.80***	***10.20***	Cap'l Spending per sh	***11.70***
16.82	17.27	17.91	18.42	19.18	19.10	21.58	22.98	23.49	24.44	25.62	26.66	28.35	30.47	31.95	33.61	***34.70***	***35.00***	Book Value per sh	***37.75***
31.71	32.49	33.29	34.23	36.79	39.33	41.77	42.81	44.19	45.09	45.56	45.96	46.15	46.36	46.52	47.38	***49.00***	***50.00***	Common Shs Outst'g C	***53.00***
16.0	19.0	19.9	19.2	14.3	20.6	15.9	17.3	20.3	12.2	14.0	15.7	15.0	15.8	17.9	19.4	*Bold figures are*		Avg Ann'l P/E Ratio	***15.0***
1.04	.97	1.09	1.09	.76	1.10	.86	.92	1.22	.81	.89	.98	.95	.89	.94	.98	*Value Line*		Relative P/E Ratio	***.95***
4.2%	3.8%	3.6%	3.8%	3.5%	3.2%	2.6%	2.6%	3.2%	4.0%	3.2%	2.8%	2.8%	2.7%	2.7%	2.9%	*estimates*		Avg Ann'l Div'd Yield	***3.2%***

CAPITAL STRUCTURE as of 9/30/15
Total Debt $1560.2 mill. **Due in 5 Yrs** $405.0 mill.
LT Debt $1540.4 mill. **LT Interest** $72.0 mill.
(Total interest coverage: 3.8x) (50% of Cap'l)
Leases, Uncapitalized Annual rentals $6.0 mill.
Pension Assets-12/14 $799.7 mill.
Oblig. $1132.4 mill.
Pfd Stock None

Common Stock 47,375,398 shs.
as of 10/28/15

MARKET CAP: $2.8 billion (Mid Cap)

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		19-21
2024.7	2152.1	2144.7	1893.8	1830.4	1887.2	1927.8	1950.8	2121.7	2463.6	***2525***	***2650***	Revenues ($mill)	***3100***
80.5	83.2	61.0	87.5	103.9	112.3	133.3	145.3	141.1	138.3	***155***	***175***	Net Profit ($mill)	***255***
37.3%	36.5%	40.1%	34.0%	34.7%	36.2%	36.2%	35.0%	35.7%	***36.5%***	***35.0%***	***35.0%***	Income Tax Rate	***35.0%***
4.0%	3.9%	2.8%	4.6%	5.7%	6.0%	6.9%	7.4%	6.7%	5.6%	***6.1%***	***6.6%***	Net Profit Margin	***8.2%***
60.6%	58.1%	55.3%	53.5%	49.1%	43.2%	49.2%	49.4%	52.4%	49.3%	***49.5%***	***49.5%***	Long-Term Debt Ratio	***48.5%***
39.4%	41.9%	44.7%	46.5%	50.9%	56.8%	50.8%	50.6%	47.6%	50.7%	***50.5%***	***50.5%***	Common Equity Ratio	***51.5%***
2287.8	2349.7	2323.3	2371.4	2291.7	2155.9	2576.9	2793.7	3123.9	3143.5	***3350***	***3450***	Total Capital ($mill)	***3900***
2668.1	2845.3	2983.3	3034.5	3072.4	3218.9	3343.8	3486.1	3658.4	3891.1	***4050***	***4250***	Net Plant ($mill)	***4650***
5.5%	5.5%	4.5%	5.4%	6.1%	6.4%	6.4%	6.3%	5.7%	***5.5%***	***5.5%***	***6.0%***	Return on Total Cap'l	***7.5%***
8.9%	8.5%	5.9%	7.9%	8.9%	9.2%	10.2%	10.3%	9.5%	8.7%	***9.0%***	***10.0%***	Return on Shr. Equity	***13.0%***
8.9%	8.5%	5.9%	7.9%	8.9%	9.2%	10.2%	10.3%	9.5%	8.7%	***9.0%***	***10.0%***	Return on Com Equity	***13.0%***
5.2%	4.8%	2.1%	4.1%	5.1%	5.3%	6.1%	6.1%	5.0%	3.9%	***4.0%***	***4.5%***	Retained to Com Eq	***6.5%***
42%	44%	63%	48%	43%	43%	40%	41%	47%	55%	***57%***	***55%***	All Div'ds to Net Prof	***48%***

CURRENT POSITION ($MILL.)	2013	2014	9/30/15
Cash Assets	41.1	39.6	33.0
Other	453.6	567.2	445.6
Current Assets	494.7	606.8	478.6
Accts Payable	183.5	168.0	129.3
Debt Due	11.1	24.2	19.8
Other	239.6	277.9	345.6
Current Liab.	434.2	470.1	494.7
Fix. Chg. Cov.	430%	395%	383%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '12-'14 to '19-'21
Revenues	1.0%	-1.5%	*4.5%*
"Cash Flow"	4.5%	6.0%	*5.0%*
Earnings	8.5%	11.0%	*7.0%*
Dividends	5.0%	8.0%	*7.5%*
Book Value	5.0%	5.0%	*3.0%*

Cal-endar	QUARTERLY REVENUES ($ mill.) D Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	613.5	411.6	387.3	538.4	1950.8
2014	608.4	453.2	432.5	627.7	2121.7
2015	734.2	538.6	505.4	685.4	2463.6
2016	***760***	***560***	***520***	***685***	***2525***
2017	***790***	***585***	***545***	***720***	***2640***

Cal-endar	EARNINGS PER SHARE A Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2013	1.73	.22	d.06	1.22	3.11
2014	1.51	.21	.04	1.25	3.01
2015	1.53	.10	d.10	1.38	2.92
2016	***1.60***	***.20***	***Nil***	***1.40***	***3.20***
2017	***1.70***	***.25***	***.05***	***1.50***	***3.50***

Cal-endar	QUARTERLY DIVIDENDS PAID B■† Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	.265	.295	.295	.295	1.15
2013	.295	.330	.330	.330	1.29
2014	.330	.365	.365	.365	1.43
2015	.365	.405	.405	.405	1.58
2016	.405	.450			

BUSINESS: Southwest Gas Corporation is a regulated gas distributor serving approximately 1.9 million customers in sections of Arizona, Nevada, and California. Comprised of two business segments: natural gas operations and construction services. 2014 margin mix: residential and small commercial, 85%; large commercial and industrial, 4%; transportation, 11%. Total throughput: 1.9 billion therms. Has 6,232 employees. Off. & Dir. own 1.5% of common stock; BlackRock Inc., 9.6%; The Vanguard Group, Inc., 6.9%; GAMCO Investors, Inc., 6.8%; T. Rowe Price Assoc., Inc., 6.5% (3/15 Proxy). Chairman: Michael J. Melarkey. Pres. & CEO: John Hester. Inc.: CA. Address: 5241 Spring Mountain Road, Las Vegas, Nevada 89193. Tel.: 702-876-7237. Internet: www.swgas.com.

Shares of Southwest Gas have traded higher in recent months. Utility stocks have fared particularly well lately, as volatility in the broader equity markets has prompted investors to seek safer alternatives. This may well continue to be the case going forward, though it's worth pointing out that the company's operations are not immune to a macroeconomic downturn.

The board of directors has increased the dividend by 11%. Starting with the May dividend, the quarterly payout will be $0.45 per share. Dividend growth will probably continue going forward.

The company finished the year on a good note. The natural gas segment gained from rate relief and growth in the customer base, while the construction services business benefited from additional pipe replacement work and favorable weather conditions. Even so, dramatic growth in construction expenses hurt earnings for full-year 2015. Greater employee-related expenses also pressured performance. On top of that, weakness in equity markets has resulted in a reduction of the cash surrender value of company-owned life insurance policies.

We anticipate solid performance in the current year. This trend will probably continue in 2017. The utility business ought to benefit from modest customer growth, infrastructure tracking programs, and expansion projects. Greater operating expenses should be a partial offset here, though. Elsewhere, construction services subsidiary Centuri will probably experience healthy demand, given the need to replace aging infrastructure. The long-term fundamentals for this business appear particularly favorable. With a strong base of utility clients, this line should be able to grow its business with multiyear pipeline replacement programs.

These shares are favorably ranked for Timeliness. We expect solid growth for the company over the pull to late decade. Meanwhile, the dividend yield is decent, though not outstanding, for a gas utility. Total return potential is modest here, and relatively well defined. Southwest Gas, however, earns good scores for Price Stability, Earnings Predictability, and Price Growth Persistence.

Michael Napoli, CFA *March 4, 2016*

(A) Diluted earnings. Excl. nonrec. gains (losses): '02, (10¢); '05, (11¢); '06, 7¢. Next egs. report due early May. (B) Dividends historically paid early March, June, September, and December. ■† Div'd reinvestment and stock purchase plan avail. (C) In millions. (D) Totals may not sum due to rounding.

Company's Financial Strength	B++
Stock's Price Stability	90
Price Growth Persistence	85
Earnings Predictability	80

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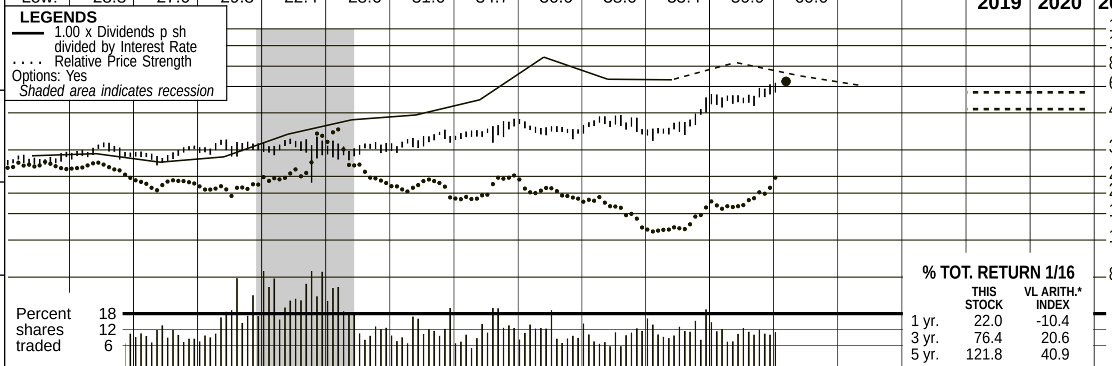
WGL HOLDINGS NYSE-WGL

RECENT PRICE 67.67 | P/E RATIO 21.5 (Trailing: 21.2 Median: 15.0) | RELATIVE P/E RATIO 1.27 | DIV'D YLD 2.9% | VALUE LINE

TIMELINESS 2 Raised 2/19/16
SAFETY 1 Raised 4/2/93
TECHNICAL 3 Raised 2/5/16
BETA .80 (1.00 = Market)

High:	34.8	33.6	35.9	37.1	35.5	40.0	45.0	45.0	47.0	56.8	65.6	69.1
Low:	28.8	27.0	29.8	22.4	28.6	31.0	34.7	36.0	38.0	35.4	50.9	60.0



Target Price Range

2019	2020	2021

2019-21 PROJECTIONS

	Price	Gain	Ann'l Total Return
High	60	(-10%)	*Nil*
Low	50	(-25%)	*-4%*

Insider Decisions

	A	M	J	J	A	S	O	N	D
to Buy	0	0	0	0	0	0	0	0	0
Options	0	0	0	0	0	0	13	0	0
to Sell	0	0	0	0	0	0	1	1	0

Institutional Decisions

	1Q2015	2Q2015	3Q2015
to Buy	116	117	109
to Sell	99	104	113
Hld's(000)	31712	32440	32753

% TOT. RETURN 1/16

	THIS STOCK	VL ARITH.* INDEX
1 yr.	22.0	-10.4
3 yr.	76.4	20.6
5 yr.	121.8	40.9

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	© VALUE LINE PUB. LLC	19-21
22.19	29.80	32.63	42.45	42.93	44.94	53.96	53.51	52.65	53.98	53.60	53.75	47.07	47.70	53.73	53.42	*52.00*	*54.00*	Revenues per sh A	*59.00*
3.20	3.24	2.63	4.00	3.87	3.97	3.84	3.89	4.34	4.44	4.11	4.01	4.53	4.29	4.80	5.60	*5.65*	*5.80*	"Cash Flow" per sh	*6.45*
1.79	1.88	1.14	2.30	1.98	2.13	1.94	2.09	2.44	2.53	2.27	2.25	2.68	2.31	2.68	3.16	*3.15*	*3.20*	Earnings per sh B	*3.55*
1.24	1.26	1.27	1.28	1.30	1.32	1.35	1.37	1.41	1.47	1.50	1.55	1.59	1.66	1.72	1.83	*1.87*	*1.93*	Div'ds Decl'd per sh C■	*2.03*
2.67	2.68	3.34	2.65	2.33	2.32	3.27	3.33	2.70	2.77	2.57	3.94	4.87	6.04	7.63	9.32	*16.70*	*18.00*	Cap'l Spending per sh	*21.00*
15.31	16.24	15.78	16.25	16.95	17.80	18.86	19.83	20.99	21.89	22.82	23.49	24.64	24.65	24.08	24.97	*26.40*	*27.65*	Book Value per sh D	*31.80*
46.47	48.54	48.56	48.63	48.67	48.65	48.89	49.45	49.92	50.14	50.54	51.20	51.52	51.70	51.76	49.79	*50.00*	*50.00*	Common Shs Outst'g E	*50.00*
14.6	14.7	23.1	11.1	14.2	14.7	15.5	15.6	13.7	12.6	15.1	17.0	15.3	18.2	15.2	17.0	*Bold figures are*		Avg Ann'l P/E Ratio	*15.0*
.95	.75	1.26	.63	.75	.78	.84	.83	.82	.84	.96	1.07	.97	1.02	.80	.93	*Value Line*		Relative P/E Ratio	*.95*
4.8%	4.6%	4.8%	5.0%	4.6%	4.2%	4.5%	4.2%	4.2%	4.6%	4.4%	4.1%	3.9%	3.9%	4.2%	3.4%	*estimates*		Avg Ann'l Div'd Yield	*4.0%*

CAPITAL STRUCTURE as of 12/31/15
Total Debt $1498.5 mill. **Due in 5 Yrs** $225.0 mill.
LT Debt $945.6 mill. **LT Interest** $50.5 mill.
(LT interest earned: 6.2x; total interest coverage: 5.7x) (43% of Total Capital)
Pension Assets-9/15 $1,218.7 mill. **Oblig.** $1,218.7 mill.
Preferred Stock $28.2 mill. **Pfd. Div'd** $1.3 mill.

Common Stock 49,847,937 shs. **as of 1/31/16**

MARKET CAP: $3.4 billion (Mid Cap)

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		19-21
2637.9	2646.0	2628.2	2706.9	2708.9	2751.5	2425.3	2466.1	2780.9	2659.8	*2600*	*2700*	Revenues ($mill) A	*2950*
96.0	102.9	122.9	128.7	115.0	115.5	138.4	119.7	139.0	158.2	*158*	*160*	Net Profit ($mill)	*175*
39.0%	39.1%	37.1%	39.1%	38.7%	42.4%	40.1%	30.2%	29.0%	*39.0%*	*39.0%*	*39.0%*	Income Tax Rate	*39.0%*
3.6%	3.9%	4.7%	4.8%	4.2%	4.2%	5.7%	4.9%	5.0%	6.0%	*6.1%*	*6.0%*	Net Profit Margin	*6.0%*
37.8%	37.9%	35.9%	33.3%	33.4%	32.3%	31.2%	28.7%	34.8%	42.6%	*42.5%*	*44.0%*	Long-Term Debt Ratio	*48.0%*
60.4%	60.3%	62.4%	65.0%	65.0%	66.2%	67.3%	69.8%	63.8%	56.1%	*56.0%*	*55.0%*	Common Equity Ratio	*51.0%*
1526.1	1625.4	1679.5	1687.7	1774.4	1818.1	1886.9	1826.8	1954.0	2215.6	*2345*	*2510*	Total Capital ($mill)	*3120*
2067.9	2150.4	2208.3	2269.1	2346.2	2489.9	2667.4	2907.5	3314.4	3672.7	*4070*	*4510*	Net Plant ($mill)	*6135*
7.6%	7.6%	8.5%	8.8%	7.6%	7.5%	8.3%	7.5%	8.1%	*8.3%*	*8.0%*	*8.0%*	Return on Total Cap'l	*7.0%*
10.1%	10.2%	11.4%	11.4%	9.7%	9.4%	10.7%	9.2%	10.9%	12.7%	*12.0%*	*11.5%*	Return on Shr. Equity	*11.0%*
10.3%	10.4%	11.6%	11.6%	9.9%	9.5%	10.8%	9.3%	11.0%	12.7%	*12.0%*	*11.5%*	Return on Com Equity	*11.0%*
3.2%	3.5%	5.0%	5.0%	3.3%	3.4%	4.8%	2.6%	4.3%	5.4%	*5.0%*	*4.5%*	Retained to Com Eq	*4.5%*
69%	66%	57%	57%	67%	64%	56%	72%	62%	57%	*59%*	*60%*	All Div'ds to Net Prof	*57%*

CURRENT POSITION ($MILL.)

	2014	2015	12/31/15
Cash Assets	8.8	6.7	15.8
Other	826.7	774.7	902.2
Current Assets	835.5	781.4	918.0
Accts Payable	313.2	325.1	309.3
Debt Due	473.5	357.0	552.9
Other	233.6	300.8	318.7
Current Liab.	1020.3	982.9	1180.9
Fix. Chg. Cov.	535%	535%	535%

ANNUAL RATES of change (per sh)	Past 10 Yrs.	Past 5 Yrs.	Est'd '12-'14 to '19-'21
Revenues	2.5%	-1.5%	*2.5%*
"Cash Flow"	2.5%	1.5%	*5.0%*
Earnings	3.5%	1.5%	*5.0%*
Dividends	2.5%	3.0%	*2.5%*
Book Value	4.0%	3.0%	*4.5%*

Fiscal Year Ends	QUARTERLY REVENUES ($ mill.) A Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2013	686.7	891.4	478.1	409.9	2466.1
2014	680.5	1174.0	467.5	458.9	2780.9
2015	749.2	1001.7	441.2	467.7	2659.8
2016	613.4	*1055*	*450*	*481.6*	*2600*
2017	*640*	*1080*	*475*	*505*	*2700*

Fiscal Year Ends	EARNINGS PER SHARE A B Dec.31	Mar.31	Jun.30	Sep.30	Full Fiscal Year
2013	1.14	1.75	d.03	d.55	2.31
2014	.99	1.84	.02	d.17	2.68
2015	1.16	2.02	.22	d.23	3.16
2016	1.18	*2.00*	*.21*	*d.24*	*3.15*
2017	*1.20*	*2.01*	*.22*	*d.23*	*3.20*

Cal-endar	QUARTERLY DIVIDENDS PAID C ■ Mar.31	Jun.30	Sep.30	Dec.31	Full Year
2012	.39	.40	.40	.40	1.59
2013	.40	.42	.42	.42	1.66
2014	.42	.44	.44	.44	1.74
2015	.44	.463	.463	.463	
2016	.463	.488			

BUSINESS: WGL Holdings, Inc. is the parent of Washington Gas Light, a natural gas distributor in Washington, D.C. and adjacent areas of VA and MD to resident'l and comm'l users (1,129,865 meters). Hampshire Gas, a federally regulated sub., operates an underground gas-storage facility in WV. Non-regulated subs.: Wash. Gas Energy Svcs. sells and delivers natural gas and provides energy-related products in the D.C. metro area; Wash. Gas Energy Sys. designs/installs comm'l heating, ventilating, and air cond. systems. BlackRock, Inc. owns 8.7% of common stock; Off./dir. less than 1% (1/16 proxy). Chrmn. & CEO: Terry D. McCallister. Inc.: D.C. and VA. Addr.: 101 Const. Ave., N.W., Washington, D.C. 20080. Tel.: 202-624-6410. Internet: www.wglholdings.com.

Since our December review, shares of WGL Holdings are trading about 10% higher in price. This likely reflects the better-than-expected December-period bottom line. In comparison, the S&P 500 declined almost 8% over this same period.

Meanwhile, the company did post somewhat mixed financial results for its fiscal first quarter (ended December 31st). On the downside, revenues declined 18%, due to double-digit decreases in both utility and nonutility volumes. On the upside, operating expenses fell 290 basis points as a function of the top line. After accounting for a 3.6% reduction in the company's income tax expense, the bottom line managed a modest increase, to $1.18 a share. This was $0.02 higher than our earlier call, which prompted us to raise our fiscal 2016 (ends September 30th) earnings estimate, to $3.15 a share. This also falls nicely within management's guidance range of $3.00-$3.20. Meantime, we have introduced our fiscal 2017 top- and bottom-line estimates at $2.7 billion and $3.20 a share, respectively. Growth ought to be fueled by new customer accounts (WGL is up about 12,500 from last year's first quarter), as well as from capital projects intended to widen its pipeline system. For example, the Constitution Pipeline is expected in service by the end of this year. Investments in the Central Penn Line and Mountain Valley Pipeline, as well as a proposed rate case in Virginia, are all interesting developments.

The financial position is in good shape and improving. The long-term debt load has remained stable and accounts for about 43% of total capital. Note that the company gets a high mark (A) for Financial Strength. What's more, the board recently approved a roughly 5.5% hike in the quarterly dividend, to $0.4875. Nonetheless, while this is encouraging, WGL does not stand out for its dividend yield when viewed against the natural gas utility industry average.

At the moment, these high-quality shares may appeal to momentum accounts. However, WGL stock is trading above our 3- to 5-year Target Price Range, suggesting it lacks appreciation potential over that time frame.

Bryan J. Fong *March 4, 2016*

(A) Fiscal years end Sept. 30th.
(B) Based on diluted shares. Excludes nonrecurring losses: '01, (13¢); '02, (34¢); '07, (4¢); '08, (14¢) discontinued operations: '06, (15¢). Qtly egs. may not sum to total, due to change in shares outstanding. Next earnings report due late April. (C) Dividends historically paid early February, May, August, and November. ■ Dividend reinvestment plan available. (D) Includes deferred charges and intangibles. '15: $705.8 million, $14.18/sh. (E) In millions.

Company's Financial Strength	A
Stock's Price Stability	90
Price Growth Persistence	50
Earnings Predictability	75

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COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
REQUEST FOR INFORMATION
DATED JULY 8, 2016

24. Provide all of Mr. Moul's exhibits in their native spreadsheet format with cell formulas intact.

Response:

Please refer to Columbia's response to KY PSC Staff Data Request, PSC 2-44.

**COLUMBIA GAS OF KENTUCKY, INC.
RESPONSE TO ATTORNEY GENERAL'S INITIAL
REQUEST FOR INFORMATION
DATED JULY 8, 2016**

25. Provide copies of all articles cited by Mr. Moul in his Direct Testimony.

Response:

Copies of the requested documents are identified below by reference to where they appear in Mr. Moul's direct testimony and are provided as attachments to this answer, as follows:

- Footnote (7): Gordon, Gordon & Gould, "Choice Among Methods of Estimating Share Yield," The Journal of Portfolio Management (Spring 1989). A copy provided as AG 1-25 Attachment A.

- Page 43. Modigliani and Miller, "The Cost of Capital, Corporation Finance and the Theory of Investment," The American Economic Review, Vol. 48, No. 3 (June 1958), pages 261-297. A copy of the referenced pages is provided as AG 1-25 Attachment B.

- Page 48. <u>Blue Chip Financial Forecast</u>, April 1, 2016. A copy is provided as AG 1-25 Attachment C.
- Page 48. <u>Blue Chip Financial Forecast</u>, December 1, 2015. A copy is provided as AG 1-25 Attachment D.

- Page 49. <u>Stocks, Bonds, Bills and Inflation</u>, 2015 Classic Yearbook. A copy is provided as AG 1-25 Attachment E.

- Footnote (8): Robert S. Hamada, "The Effects of the Firm's Capital Structure on the Systematic Risk of Common Stocks" <u>The Journal of Finance</u> Vol. 27, No. 2, Papers and Proceedings of the Thirtieth Annual Meeting of the American Finance Association, New Orleans, Louisiana, December 27-29, 1971. (May 1972), pp.435-452. A copy of the referenced pages is provided as AG 1-25 Attachment F.

- Page 56. <u>Standard & Poor's Analysts' Handbook</u>, April 1, 2016 and Value Line page for April 1, 2016. A copy is provided as AG 1-25 Attachment G.

- Pages 57: Fundamentals of Financial Management, fifth edition, page 62. A copy is provided as AG 1-25 Attachment H.

- Page 57: The Journal of Finance, June 1992 ("The Cross-Section of Expected Stock Returns"). A copy is provided as AG 1-25 Attachment I.

- Page 57: "Equity and the Small-Stock Effect," published in Public Utility Fortnightly, October 15, 1995. A copy is provided as AG 1-25 Attachment J.

Choice among methods of estimating share yield

The search for the growth component in the discounted cash flow model.

David A. Gordon, Myron J. Gordon, and Lawrence I. Gould

The yield at which a share of stock is selling, also called its expected return or required return, is an important statistic in finance. Firms use it in choosing among investment opportunities and financing alternatives, and investors use it in making portfolio decisions. Nevertheless, the yield at which a share is selling is a difficult quantity to measure, which has limited its use in the practice of finance. This paper develops and tests a basis for choice among alternative methods of estimating a share's yield.

A share's yield, like a bond's yield, is the discount rate that equates its expected future payments with its current price. A bond's yield is easy to measure under the common practice of ignoring default risk, as the future payments are then known with certainty. The future payments on a share, however, are dividends and market price, and these payments are uncertain.

The common practice is to represent these future dividend payments with estimates of two numbers: One is the coming dividend, and the other is a growth rate. The latter can be an estimate of the long-run growth rate in the dividend or of the growth rate in price over the coming period. In the latter case, the estimate is called the expected holding-period return (EHPR); in the former case, it is called the discounted cash flow yield (DCFY).[1] In either case, the estimate of a share's yield reduces to the sum of its dividend yield and a future growth rate, with the latter inferred in some way from historical data.

There is a wide variety of acceptable methods for using historical data to estimate future growth. This variation in method is illustrated in the testimony of expert witnesses before public utility commissions on the fair return for a public utility. In these cases, the estimates and the methods used are a matter of public record. Some idea of the various methods can be found in Morin (1984) and Kolbe, Read, and Hall (1984). The performance of alternative estimating methods has been examined in Gordon (1974), Kolbe, Read, and Hall (1984), Brigham, Shome, and Vinson (1985), and Harris (1986).

We have derived our basis for comparing the accuracy of alternative methods for estimating the DCFY on a share from the generally accepted propositions that yield should vary according to risk, and that beta is the best estimate of risk. Hence, the DCFY should vary among shares with beta, and, between two methods for estimating growth, the superior method is the one for which the variation in yield among shares is explained better by the variation in beta among the shares.

First we present simple, plausible, and objective measurement rules for implementing four popular and/or attractive methods for estimating the DCFY. We then describe how sample statistics may be used to judge the accuracy of each method. We also describe how the CAPM model has been used to estimate share yield and explain why we do not compare it with the various DCFY methods. The following section carries out the comparison with samples of utility and industrial shares, and the last section pre-

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sents the conclusions that may be drawn from the findings.

ALTERNATIVE MEASUREMENT RULES FOR A SHARE'S YIELD

Under the DCF method or model for estimating the expected return on a stock, the yield for the jth stock is:

$$DCFY_{jt} = DYD_{jt} + GR_{jt}, \quad (1)$$

where:

$DCFY_{jt}$ = DCF yield on the jth stock at time t,

DYD_{jt} = dividend yield on the jth stock at time t, and

GR_{jt} = long-run growth rate in the dividend on the jth stock that investors expect at time t.

In what follows, we omit the time and firm subscripts on the variables when they are not required. Also, DCFY will refer to the unknown true yield on a share.

The difficult problem in arriving at the DCFY is estimation of the long-run growth rate that investors expect. Four estimates of that quantity are:

EGR = rate of growth in earnings per share over a prior time period, usually the last five years;

DGR = rate of growth in dividend per share over a prior time period, usually the last five years;

FRG = consensus among security analyst forecasts of the growth rate in earnings, over the next five years; and

BRG = an average over the prior five years of the product of the retention rate b and rate of return on common equity r on a stock.

The estimate of share yield that incorporates each of these estimates of growth is denoted KEGR, KDGR, KFRG, and KBRG, respectively.

A case can be made for each of the four methods for estimating growth. KEGR, KDGR, and KBRG have been widely used in public utility testimony and in research on stock valuation models. The rationale for KEGR is the belief that the past growth rate in earnings is the best predictor of future growth in earnings and dividends. The rationale for KDGR is that the future growth rate in dividends is the statistic we want to estimate, and the past dividend record is free of the noise in past earnings.[2] The rationale for KBRG is that all variables will grow at this rate if the firm earns r and retains b. Furthermore, as Gordon and Gould (1980) show, KEGR and KDGR will be biased in one direction or another if r and b have changed over the last five years. As for KFRG, security analysts are professionals employed to forecast future performance; their forecasts are widely accepted by investors. The IBES collection of forecast growth rates of security analysts compiled by Lynch, Jones, and Ryan has increased the popularity of this estimate.

As stated earlier, we may also take the yield on a share as the sum of the dividend yield and the expected rate of growth in price over the coming period. This estimate of a share's yield is widely used in testing the CAPM, with the average HPR over the prior five years commonly used in such empirical work. On the other hand, this estimate of a share's yield varies so widely among firms and over time as to be patently in error as an estimate of share yield.[3]

BASIS OF COMPARISON

To compare the accuracy of the four estimates of the DCFY stated above, we regress the data under each estimate on beta for a sample of shares. If KEGR is the estimate,

$$KEGR_j = \alpha_0 + \alpha_1 BETA_j + \epsilon_j. \quad (2)$$

The rationale for this expression lies in the risk premium theory of share yield, where the share yield is equal to the interest rate plus a risk premium that varies with the share's relative risk. Hence, if BETA is an error-free index of relative risk, α_0 is equal to the interest rate, and α_1 is the risk premium on the market portfolio or standard share.[4]

The higher the correlation between KEGR and BETA, assuming that α_1 is positive, the greater the confidence we may have in KEGR as an estimate of DCFY. We cannot rely solely on the correlation, though, in selecting among the methods for estimating DCFY. Errors in KEGR as a basis for estimating the DCFY on the jth share have random and systematic components. The former is ϵ_j, and its average value can be taken as the root mean square error of the regression (MSE). The larger the root MSE of the regression, the less attractive KEGR is as an estimate of share yield, because the error makes the problem of choice between $KEGR_j$ and $KEGR_j - \epsilon_j$ more acute. (That problem will be discussed shortly.)

The systematic error is the difference between the unknown true yield on the jth share, $DCFY_j$, and the value predicted by Equation (2). There is no obvious measure of the systematic error, as we do not know $DCFY_j$, but sample values of α_0 may provide information on its average value. The difference between α_0 and the interest rate is an indicator of systematic error, because the difference is zero under the risk premium theory. Error in the measurement of BETA biases α_0 upward, but, with the same BETA for each share used in all four regressions, differences in α_0 are indicators of systematic error.[5]

In addition to regression statistics, the sample mean and standard deviation of KEGR is a source of information on its accuracy as a method for the estimation of DCFY. If the mean departs radically from the long-term bond rate, or if the standard deviation indicates an unreasonable range of variation among shares, the accuracy of the method is open to question. Also, the sample mean may be a source of information on the systematic error for a method of estimation. Hence, sample values for the mean, standard deviation, correlation, root MSE, and constant term all contribute to a judgment on a method's accuracy for estimating the DCFY on a share. Unfortunately, there is no simple criterion for choice among the alternatives.

Once a conclusion is reached on the most accurate method for estimating DCFY — say, KEGR — we then have the problem of choice between $KEGR_j$ and $KEGR_j - \epsilon_j$ for the jth share. If the random error in $KEGR_j$ is due to error in its measurement for the jth share, we simply use the value predicted by Equation (2), which is $KEGR_j - \epsilon_j$. On the other hand, KEGR and DCFY may vary among shares with other (omitted) variables as well as BETA, in which case ϵ_j is also due to the omitted variables, and $KEGR_j$ may be the better estimate of DCFY. Unfortunately, we have no basis for choice among these two hypotheses, and the smaller the root MSE the less troublesome the problem of choice between them.

A more favorable tax treatment of capital gains over dividends should make investors prefer capital gains to dividends. As Brennan (1973) has shown, the yield investors require on a share would then vary with the excess of its dividend yield over the interest rate. To recognize this, Equation (2) becomes

$$KEGR_j = \alpha_0 + \alpha_1 BETA_j + \alpha_2 DMI_j + \epsilon_j, \qquad (3)$$

with DMI_j the excess of the dividend yield over the interest rate for the jth firm. Although the tax effect should make α_2 positive, its information in DMI on share risk would tend to make α_2 negative. That is, dividend yield varies inversely with expected growth, and we would find α_2 negative insofar as growth is risky. To the extent that these two influences of the dividend yield offset each other, α_2 will tend toward zero.

The CAPM theory of how expected return varies among shares has been proposed as an alternative to the DCF model for measuring yield. Its value for the jth stock is

$$EHPR_j = INTR + BETA_j[EHPR_m - INTR], \qquad (4)$$

where:

$EHPR_j$ = expected holding-period return on the jth share,

INTR = one-period risk-free interest rate,

$EHPR_m$ = expected holding-period return on the market portfolio.

There is an important difference between this CAPM model of share yield and the DCF model represented by Equation (1). The latter is merely an instrument for measuring share yield: There is nothing in the DCF model that explains the variation in yield among shares. The CAPM, on the other hand, is a theory on why and how yield varies among shares, but one must go outside of the theory to estimate the variables on the right-hand side of Equation (4). Given rules for estimating the variables, EHPR and BETA, empirical work then provides a joint test of the theory and the estimating rules, such as we are carrying out here.[6]

The CAPM nonetheless has been used to estimate share yield in testimony before regulatory commissions by assigning numbers to each of the quantities on the right-hand side of Equation (4). For INTR, a long-term bond yield is sometimes used instead of a one-period rate. BETA is estimated by conventional methods.

The big problem is the expected return on the market portfolio. Here the practice has been to use the average realized risk premium over a period of about fifty years as the estimate of $EHPR_m - INTR$ in Equation (4). Although the implicit assumption is that the risk premium is a constant over time, we would expect the premium to change from one period to the next for various reasons, among them changes in the interest rate, the risk premium on the market portfolio, and the relative taxation of interest and share income. Hence, this estimate of share yield is more or less in error at any particular time, but we have no way of estimating this error and comparing the method with the others.

COMPARATIVE PERFORMANCE

We carried out our empirical work with a sample of 75 large electric and gas utility firms and a sample of 244 firms that includes 169 industrial firms drawn from the S&P 400. We obtained share yield under the four methods for estimating it as of the start of the year for the years 1984, 1985, and 1986.

For the explanatory variables, BETA for each share on each date was obtained by regressing the monthly HPRs for the share on the monthly HPRs for the S&P 500 over the prior five years. DMI for a share is its dividend yield less the interest rate on the one-month Treasury bill at the start of each year. EGR and DGR are the growth rates in earnings and in dividends per share, respectively, over the prior five years as reported on the Value Line Tape. BRG is a weighted average of the retention growth rates over the prior five years,[7] and FRG is the average of forecast growth rates in earnings over the next five years reported by IBES. The corresponding estimates of share yield were obtained by adding the dividend yield at the start of each year to the estimate of growth.

Table 1 presents the statistics that we obtained with KBRG and KFRG as the estimates of DCFY for the sample of utility shares and of all shares. The means of KBRG for the utility shares seems reasonable, with the interest rate on ten-year government bonds the standard of comparison, the latter being 11.67%, 10.43%, and 9.19% at the start of 1984, 1985, and 1986, respectively.[8] The standard deviations for KBRG are small enough to make its range of variation well within the bounds of reason. The lower means for all shares reveal that the means for industrial shares are below the means for utility shares.[9] This casts doubt on the accuracy of KBRG as a basis for estimating the DCFY on industrial shares, because industrials are riskier than utility shares.

The beta model explains none of the variation in KBRG among utility shares, but the two-factor model is a substantial improvement. The DMI coefficient, α_2, is positive and significant in every year, meaning that the unfavorable tax effect of a high dividend yield dominates the favorable risk effect. The coefficient on BETA is positive and significant in two of the three years. The only disturbing feature of the data is the sharp fall in R^2 and the corresponding rise in the root MSE relative to the standard deviation of KBRG as we go from 1984 to 1986.

The KBRG statistics for all shares are substantially inferior to the utility share statistics. This forces the unhappy conclusion that, for industrial shares, BETA is a poor measure of risk, or KBRG is a poor measure of DCFY, or both.

The KFRG statistics for the utility sample are superior to the KBRG statistics. The means are reasonable under the two criteria of being above the interest rate and moving with it. The range of variation of KFRG suggested by its standard deviations seems reasonable. The statistics for the beta model are a slight improvement on the corresponding statistics for KBRG. Furthermore, the two-factor model does a good job of explaining the variation in KFRG among

TABLE 1

Sample and Regression Statistics for KBRG and KFRG, Utility Shares and All Shares, 1984, 1985, and 1986

	KBRG			KFRG		
	1984	1985	1986	1984	1985	1986
			UTILITY SHARES (75)			
Mean	14.84	14.38	12.93	15.64	14.56	12.93
Standard Deviation	2.51	1.87	1.80	2.26	1.43	1.42
Beta Model α_0	14.26	13.96	13.05	15.14	13.48	12.74
α_1	1.44	1.21	−0.28	1.25	3.09	0.42
t-statistic	(0.97)	(1.12)	(0.19)	(0.93)	(4.14)	(0.37)
Root MSE	2.52	1.87	1.81	2.26	1.29	1.43
R^2	0.013	0.017	0.001	0.012	0.190	0.002
Two-Factor Model α_0	12.45	12.75	12.42	13.30	12.46	11.97
α_1	3.45	2.11	0.11	3.28	3.85	0.89
t-statistic	(3.13)	(2.19)	(0.08)	(3.83)	(6.33)	(0.88)
α_2	0.68	0.45	0.34	0.68	0.38	0.41
t-statistic	(8.22)	(4.88)	(2.81)	(10.73)	(6.52)	(4.65)
Root MSE	1.82	1.63	1.73	1.41	1.03	1.26
R^2	0.491	0.262	0.100	0.620	0.491	0.232
			ALL SHARES (244)			
Mean	12.98	13.19	11.86	16.17	15.87	14.31
Standard Deviation	3.86	3.21	3.52	2.60	2.32	2.30
Beta Model α_0	15.00	14.71	13.90	15.56	14.50	12.57
α_1	−2.47	−1.91	−2.40	0.74	1.72	2.05
t-statistic	(4.23)	(4.15)	(4.25)	(1.83)	(5.29)	(5.70)
Root MSE	3.73	3.10	3.40	2.59	2.20	2.16
R^2	0.069	0.066	0.069	0.014	0.104	0.118
Two-Factor Model α_0	14.34	14.42	13.95	15.40	14.61	12.75
α_1	0.09	−1.18	−2.51	1.37	1.44	1.61
t-statistic	(0.13)	(2.04)	(3.45)	(2.69)	(3.52)	(3.49)
α_2	0.48	0.17	−0.02	0.12	−0.06	−0.10
t-statistic	(6.04)	(2.09)	(0.24)	(2.01)	(1.12)	(1.53)
Root MSE	3.49	3.08	3.41	2.57	2.20	2.16
R^2	0.191	0.083	0.070	0.030	0.108	0.127

utility shares. The R^2s are higher here than for KBRG in every year. Finally, α_2 is positive and significant in every year, and α_1 is not significant only in 1986.

The implicit means of KFRG for the industrial shares seem high but not beyond reason. On the other hand, the regression statistics for the all-shares sample are not good, which leads to the same unhappy conclusion for industrial shares as we reached for KBRG.

Table 2 presents the statistics that we obtained using KEGR and KDGR as estimates of the DCFY on the shares in our samples. Comparison of the regression statistics with those in Table 1 reveals that KEGR and KDGR, particularly the former, fall short by a wide margin of the performance of KBRG and KFRG as estimates of the DCFY on a share.

CONCLUSION

We have compared the accuracy of four methods for estimating the growth component of the discounted cash flow yield on a share: past growth rate in earnings (KEGR), past growth rate in dividends (KDGR), past retention growth rate (KBRG), and forecasts of growth by security analysts (KFRG). Criteria for the comparison were the reasonableness of sample means and standard deviations and the success of beta and dividend yield in explaining the variation in DCF yield among shares. For our sample of utility shares, KFRG performed well, with KBRG, KDGR, and KEGR following in that order, and with KEGR a distant fourth. If we had used past growth in price, it would have been an even more distant fifth. Nevertheless, none of the four estimates of growth performed well under the criteria for a sample that included industrial shares.

Before closing, we have three observations to make. First, the superior performance by KFRG should come as no surprise. All four estimates of growth rely upon past data, but in the case of KFRG a larger body of past data is used, filtered through a group of security analysts who adjust for abnormalities that are not considered relevant for future growth. We assume this is done by any analyst who develops retention growth estimates of yield for a firm. If we had done this for all seventy-five firms in our utility sample, it is likely that the correlations

TABLE 2

Sample and Regression Statistics for KEGR and KDGR, Utility Shares and All Shares, 1984, 1985, and 1986

	KEGR			KDGR		
	1984	1985	1986	1984	1985	1986
			UTILITY SHARES (75)			
Mean	16.16	0.32	14.91	16.49	15.76	14.13
Standard Deviation	3.31	3.47	4.66	3.12	2.41	2.21
Beta Model α_0	15.45	16.18	0.51	15.75	14.53	12.30
α_1	1.75	0.40	−7.87	1.83	3.53	3.99
t-statistic	(0.89)	(0.20)	(2.16)	(0.99)	(2.64)	(2.32)
Root MSE	3.32	3.49	4.55	3.12	2.32	2.15
R^2	0.010	0.001	0.060	0.013	0.087	0.069
Two-Factor Model α_0	14.20	15.83	18.76	14.10	13.56	12.64
α_1	3.13	0.66	−8.03	3.65	4.25	3.78
t-statistic	(1.66)	(0.32)	(2.18)	(2.23)	(3.26)	(2.20)
α_2	0.47	0.13	−0.13	0.61	0.35	−0.18
t-statistic	(3.32)	(0.66)	(0.42)	(5.02)	(2.86)	(1.21)
Root MSE	3.11	3.50	4.58	2.70	2.21	2.14
R^2	0.142	0.007	0.063	0.269	0.180	0.087
			ALL SHARES (244)			
Mean	11.14	9.42	7.88	15.08	13.63	11.35
Standard Deviation	10.67	11.67	11.45	6.08	6.30	6.71
Beta Model α_0	15.96	18.28	19.55	15.15	0.04	15.39
α_1	−5.90	−11.16	−13.70	−0.09	−1.78	−4.74
t-statistic	(3.62)	(7.07)	(8.10)	(0.09)	(1.92)	(4.41)
Root MSE	10.41	10.65	10.18	6.09	6.27	6.47
R^2	0.051	0.171	0.213	0.000	0.015	0.074
Two-Factor Model α_0	14.84	18.01	19.91	14.31	14.11	14.79
α_1	−1.56	−10.49	−14.62	3.17	0.63	−3.25
t-statistic	(0.77)	(5.27)	(6.72)	(2.73)	(0.55)	(2.36)
α_2	0.81	0.15	−0.21	0.61	0.55	0.34
t-statistic	(3.51)	(0.55)	(0.67)	(4.57)	(3.47)	(1.72)
Root MSE	10.18	10.67	10.19	5.86	6.13	6.45
R^2	0.097	0.172	0.215	0.080	0.062	0.085

would have been as good or better than those obtained with the analyst forecasts of growth.

Second, we examined shares and not portfolios, because our objective is to estimate the DCFY for shares and not for portfolios. As common practice in testing the CAPM has been to execute tests on portfolios instead of shares, we classified our population of shares into ten portfolios on the basis of their beta values. Regression statistics were substantially unchanged, except that correlations increased dramatically.

Finally, we must acknowledge that we have no basis for estimating the expected HPR or DCF yield for industrial shares with any confidence. Theories on financial decision-making in industrial corporations that rely on that statistic have a weak empirical foundation.

[1] The EHPR is a one-period return, while the DCFY is a yield to maturity measure. The two may differ in actuality because of measurement problems, but they also may differ in theory. That is, they may differ in the same way that interest rates on bonds of different maturities may differ. See Gordon and Gould (1984a). This source of difference between EHPR and DCFY will be ignored here.

[2] A widely accepted hypothesis is that dividends contain information on earnings, because management sets the dividend to pay out a stable fraction of normal or permanent earnings.

[3] Over a five-year period, there may even be a negative rate of growth in price for a large number of firms. Furthermore, this negative growth rate may be larger in absolute value than the dividend yield, which leads to the conclusion that investors are holding such shares to earn a negative return. The frequency of negative rates of growth in price is reduced as the prior time period used in its calculation increases in length. As that takes place, however, the estimate of the expected return for a firm approaches a constant or a constant plus the dividend yield. The expected return on a share is one statistic for which it is an error to assume that expectations are on average realized.

[4] Equation (2) is similar to the CAPM according to Sharpe, Lintner, and Mossin. They arrived at this expression under very rigorous assumptions. The heuristic risk premium model is adequate for our purposes.

[5] It may be thought that Theil's (1966) decomposition of the difference between the actual and predicted values of a variable can be used here, but in fact that decomposition applies to a different problem. It assumes that the observed (actual) past values of a variable are free of error, and it decomposes the error in a model that is employed to explain the past values. The purpose of Theil's decomposition is to cast light on the possible error in using the model to predict future values of the dependent variable. Our problem is to determine which set of observed values is closest to the true values, with the risk premium theory of share yield and BETA as the source of information on the true values. Theil's method would be appropriate for decomposing the difference between the actual and predicted values of the *realized* holding-period return on a share. The actual values here can be observed without error.

[6] There is an enormous volume of empirical work devoted to discovering whether the theory is true, but this empirical work does not provide useful estimates of the EHPR on a share. To test the truth of Equation (4), the practice has been to regress EHPR on BETA for a sample of firms with the average realized HPR over the prior five or so years used as an estimate of the EHPR. Because of the large error in the realized HPR over a prior time period, as noted earlier, neither the actual values of the dependent variable nor the values predicted by the model are usable as estimates of share yield. See Fama and MacBeth (1973) and Friend, Westerfield, and Granito (1978).

[7] BRG for a year is earnings less dividend divided by the end-of-year book value. The estimate of the expected value as of the start of 1986 is 0.3BRG85 + 0.25BRG84 + 0.20BRG83 + 0.15BRG83 + 0.10BRG82. If any value of BRG was negative, it was set equal to zero.

[8] We expect the yields on shares to be above the risk-free interest rate, but with a high enough interest rate the more favorable tax treatment of shares can reduce the yield below the interest rate. Interest rates were not that high in these years. See Gordon and Gould (1984b).

[9] The statistics reported for all shares and for utility shares were also obtained for industrial shares. All methods of estimation performed so poorly for industrial shares, however, as to suggest no confidence can be placed in any of them. To save space, we do not present statistics for the industrial shares. Whatever we want to know about them can be deduced by comparing the data for all shares and utility shares.

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THE COST OF CAPITAL, CORPORATION FINANCE AND THE THEORY OF INVESTMENT

By FRANCO MODIGLIANI AND MERTON H. MILLER*

What is the "cost of capital" to a firm in a world in which funds are used to acquire assets whose yields are uncertain; and in which capital can be obtained by many different media, ranging from pure debt instruments, representing money-fixed claims, to pure equity issues, giving holders only the right to a pro-rata share in the uncertain venture? This question has vexed at least three classes of economists: (1) the corporation finance specialist concerned with the techniques of financing firms so as to ensure their survival and growth; (2) the managerial economist concerned with capital budgeting; and (3) the economic theorist concerned with explaining investment behavior at both the micro and macro levels.[1]

In much of his formal analysis, the economic theorist at least has tended to side-step the essence of this cost-of-capital problem by proceeding as though physical assets—like bonds—could be regarded as yielding known, sure streams. Given this assumption, the theorist has concluded that the cost of capital to the owners of a firm is simply the rate of interest on bonds; and has derived the familiar proposition that the firm, acting rationally, will tend to push investment to the point

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[1] The literature bearing on the cost-of-capital problem is far too extensive for listing here. Numerous references to it will be found throughout the paper though we make no claim to completeness. One phase of the problem which we do not consider explicitly, but which has a considerable literature of its own is the relation between the cost of capital and public utility rates. For a recent summary of the "cost-of-capital theory" of rate regulation and a brief discussion of some of its implications, the reader may refer to H. M. Somers [20].

where the marginal yield on physical assets is equal to the market rate of interest.[2] This proposition can be shown to follow from either of two criteria of rational decision-making which are equivalent under certainty, namely (1) the maximization of profits and (2) the maximization of market value.

According to the first criterion, a physical asset is worth acquiring if it will increase the net profit of the owners of the firm. But net profit will increase only if the expected rate of return, or yield, of the asset exceeds the rate of interest. According to the second criterion, an asset is worth acquiring if it increases the value of the owners' equity, *i.e.*, if it adds more to the market value of the firm than the costs of acquisition. But what the asset adds is given by capitalizing the stream it generates at the market rate of interest, and this capitalized value will exceed its cost if and only if the yield of the asset exceeds the rate of interest. Note that, under either formulation, the cost of capital is equal to the rate of interest on bonds, regardless of whether the funds are acquired through debt instruments or through new issues of common stock. Indeed, in a world of sure returns, the distinction between debt and equity funds reduces largely to one of terminology.

It must be acknowledged that some attempt is usually made in this type of analysis to allow for the existence of uncertainty. This attempt typically takes the form of superimposing on the results of the certainty analysis the notion of a "risk discount" to be subtracted from the expected yield (or a "risk premium" to be added to the market rate of interest). Investment decisions are then supposed to be based on a comparison of this "risk adjusted" or "certainty equivalent" yield with the market rate of interest.[3] No satisfactory explanation has yet been provided, however, as to what determines the size of the risk discount and how it varies in response to changes in other variables.

Considered as a convenient approximation, the model of the firm constructed via this certainty—or certainty-equivalent—approach has admittedly been useful in dealing with some of the grosser aspects of the processes of capital accumulation and economic fluctuations. Such a model underlies, for example, the familiar Keynesian aggregate investment function in which aggregate investment is written as a function of the rate of interest—the same riskless rate of interest which appears later in the system in the liquidity-preference equation. Yet few would maintain that this approximation is adequate. At the macroeconomic level there are ample grounds for doubting that the rate of interest has

[2] Or, more accurately, to the marginal cost of borrowed funds since it is customary, at least in advanced analysis, to draw the supply curve of borrowed funds to the firm as a rising one. For an advanced treatment of the certainty case, see F. and V. Lutz [13].

[3] The classic examples of the certainty-equivalent approach are found in J. R. Hicks [8] and O. Lange [11].

as large and as direct an influence on the rate of investment as this analysis would lead us to believe. At the microeconomic level the certainty model has little descriptive value and provides no real guidance to the finance specialist or managerial economist whose main problems cannot be treated in a framework which deals so cavalierly with uncertainty and ignores all forms of financing other than debt issues.[4]

Only recently have economists begun to face up seriously to the problem of the cost of capital *cum* risk. In the process they have found their interests and endeavors merging with those of the finance specialist and the managerial economist who have lived with the problem longer and more intimately. In this joint search to establish the principles which govern rational investment and financial policy in a world of uncertainty two main lines of attack can be discerned. These lines represent, in effect, attempts to extrapolate to the world of uncertainty each of the two criteria—profit maximization and market value maximization—which were seen to have equivalent implications in the special case of certainty. With the recognition of uncertainty this equivalence vanishes. In fact, the profit maximization criterion is no longer even well defined. Under uncertainty there corresponds to each decision of the firm not a unique profit outcome, but a plurality of mutually exclusive outcomes which can at best be described by a subjective probability distribution. The profit outcome, in short, has become a random variable and as such its maximization no longer has an operational meaning. Nor can this difficulty generally be disposed of by using the mathematical expectation of profits as the variable to be maximized. For decisions which affect the expected value will also tend to affect the dispersion and other characteristics of the distribution of outcomes. In particular, the use of debt rather than equity funds to finance a given venture may well increase the expected return to the owners, but only at the cost of increased dispersion of the outcomes.

Under these conditions the profit outcomes of alternative investment and financing decisions can be compared and ranked only in terms of a *subjective* "utility function" of the owners which weighs the expected yield against other characteristics of the distribution. Accordingly, the extrapolation of the profit maximization criterion of the certainty model has tended to evolve into utility maximization, sometimes explicitly, more frequently in a qualitative and heuristic form.[5]

The utility approach undoubtedly represents an advance over the certainty or certainty-equivalent approach. It does at least permit us

[4] Those who have taken a "case-method" course in finance in recent years will recall in this connection the famous Liquigas case of Hunt and Williams, [9, pp. 193–96] a case which is often used to introduce the student to the cost-of-capital problem and to poke a bit of fun at the economist's certainty-model.

[5] For an attempt at a rigorous explicit development of this line of attack, see F. Modigliani and M. Zeman [14].

to explore (within limits) some of the implications of different financing arrangements, and it does give some meaning to the "cost" of different types of funds. However, because the cost of capital has become an essentially subjective concept, the utility approach has serious drawbacks for normative as well as analytical purposes. How, for example, is management to ascertain the risk preferences of its stockholders and to compromise among their tastes? And how can the economist build a meaningful investment function in the face of the fact that any given investment opportunity might or might not be worth exploiting depending on precisely who happen to be the owners of the firm at the moment?

Fortunately, these questions do not have to be answered; for the alternative approach, based on market value maximization, can provide the basis for an operational definition of the cost of capital and a workable theory of investment. Under this approach any investment project and its concomitant financing plan must pass only the following test: Will the project, as financed, raise the market value of the firm's shares? If so, it is worth undertaking; if not, its return is less than the marginal cost of capital to the firm. Note that such a test is entirely independent of the tastes of the current owners, since market prices will reflect not only their preferences but those of all potential owners as well. If any current stockholder disagrees with management and the market over the valuation of the project, he is free to sell out and reinvest elsewhere, but will still benefit from the capital appreciation resulting from management's decision.

The potential advantages of the market-value approach have long been appreciated; yet analytical results have been meager. What appears to be keeping this line of development from achieving its promise is largely the lack of an adequate theory of the effect of financial structure on market valuations, and of how these effects can be inferred from objective market data. It is with the development of such a theory and of its implications for the cost-of-capital problem that we shall be concerned in this paper.

Our procedure will be to develop in Section I the basic theory itself and to give some brief account of its empirical relevance. In Section II, we show how the theory can be used to answer the cost-of-capital question and how it permits us to develop a theory of investment of the firm under conditions of uncertainty. Throughout these sections the approach is essentially a partial-equilibrium one focusing on the firm and "industry." Accordingly, the "prices" of certain income streams will be treated as constant and given from outside the model, just as in the standard Marshallian analysis of the firm and industry the prices of all inputs and of all other products are taken as given. We have chosen to focus at this level rather than on the economy as a whole because it is at the level of the firm and the industry that the interests of the various specialists concerned with the cost-of-capital problem come most closely together. Although the emphasis has thus been placed on partial-equilibrium analysis, the results obtained also provide the essential building blocks for a general equilibrium model which shows how those prices which are here taken as given, are themselves determined. For reasons of space, however, and because the material is of interest in its own right, the presentation of the general equilibrium model which rounds out the analysis must be deferred to a subsequent paper.

I. *The Valuation of Securities, Leverage, and the Cost of Capital*

A. *The Capitalization Rate for Uncertain Streams*

As a starting point, consider an economy in which all physical assets are owned by corporations. For the moment, assume that these corporations can finance their assets by issuing common stock only; the introduction of bond issues, or their equivalent, as a source of corporate funds is postponed until the next part of this section.

The physical assets held by each firm will yield to the owners of the firm—its stockholders—a stream of "profits" over time; but the elements of this series need not be constant and in any event are uncertain. This stream of income, and hence the stream accruing to any share of common stock, will be regarded as extending indefinitely into the future. We assume, however, that the mean value of the stream over time, or average profit per unit of time, is finite and represents a random variable subject to a (subjective) probability distribution. We shall refer to the average value over time of the stream accruing to a given share as the return of that share; and to the mathematical expectation of this average as the expected return of the share.[6] Although individual investors may have different views as to the shape of the probability distri-

[6] These propositions can be restated analytically as follows: The assets of the ith firm generate a stream:

$$X_i(1),\ X_i(2)\ \cdots\ X_i(T)$$

whose elements are random variables subject to the joint probability distribution:

$$\chi_i[X_i(1),\ X_i(2)\ \cdots\ X_i(t)].$$

The return to the ith firm is defined as:

$$X_i = \lim_{T\to\infty} \frac{1}{T} \sum_{t=1}^{T} X_i(t).$$

X_i is itself a random variable with a probability distribution $\Phi_i(X_i)$ whose form is determined uniquely by χ_i. The expected return $\bar{X}_i$ is defined as $\bar{X}_i = E(X_i) = \int_{X_i} X_i \Phi_i(X_i)dX_i$. If N_i is the number of shares outstanding, the return of the ith share is $x_i = (1/N)X_i$ with probability distribution $\phi_i(x_i)dx_i = \Phi_i(Nx_i)d(Nx_i)$ and expected value $\bar{x}_i = (1/N)\bar{X}_i$.

bution of the return of any share, we shall assume for simplicity that they are at least in agreement as to the expected return.[7]

This way of characterizing uncertain streams merits brief comment. Notice first that the stream is a stream of profits, not dividends. As will become clear later, as long as management is presumed to be acting in the best interests of the stockholders, retained earnings can be regarded as equivalent to a fully subscribed, pre-emptive issue of common stock. Hence, for present purposes, the division of the stream between cash dividends and retained earnings in any period is a mere detail. Notice also that the uncertainty attaches to the mean value over time of the stream of profits and should not be confused with variability over time of the successive elements of the stream. That variability and uncertainty are two totally different concepts should be clear from the fact that the elements of a stream can be variable even though known with certainty. It can be shown, furthermore, that whether the elements of a stream are sure or uncertain, the effect of variability per se on the valuation of the stream is at best a second-order one which can safely be neglected for our purposes (and indeed most others too).[8]

The next assumption plays a strategic role in the rest of the analysis. We shall assume that firms can be divided into "equivalent return" classes such that the return on the shares issued by any firm in any given class is proportional to (and hence perfectly correlated with) the return on the shares issued by any other firm in the same class. This assumption implies that the various shares within the same class differ, at most, by a "scale factor." Accordingly, if we adjust for the difference in scale, by taking the *ratio* of the return to the expected return, the probability distribution of that ratio is identical for all shares in the class. It follows that all relevant properties of a share are uniquely characterized by specifying (1) the class to which it belongs and (2) its expected return.

The significance of this assumption is that it permits us to classify firms into groups within which the shares of different firms are "homogeneous," that is, perfect substitutes for one another. We have, thus, an analogue to the familiar concept of the industry in which it is the commodity produced by the firms that is taken as homogeneous. To complete this analogy with Marshallian price theory, we shall assume in the

[7] To deal adequately with refinements such as differences among investors in estimates of expected returns would require extensive discussion of the theory of portfolio selection. Brief references to these and related topics will be made in the succeeding article on the general equilibrium model.

[8] The reader may convince himself of this by asking how much he would be willing to rebate to his employer for the privilege of receiving his annual salary in equal monthly installments rather than in irregular amounts over the year. See also J. M. Keynes [10, esp. pp. 53–54].

analysis to follow that the shares concerned are traded in perfect markets under conditions of atomistic competition.[9]

From our definition of homogeneous classes of stock it follows that in equilibrium in a perfect capital market the price per dollar's worth of expected return must be the same for all shares of any given class. Or, equivalently, in any given class the price of every share must be proportional to its expected return. Let us denote this factor of proportionality for any class, say the kth class, by $1/\rho_k$. Then if p_j denotes the price and $\bar{x}_j$ is the expected return per share of the jth firm in class k, we must have:

$$p_j = \frac{1}{\rho_k}\bar{x}_j; \tag{1}$$

or, equivalently,

$$\frac{\bar{x}_j}{p_j} = \rho_k \text{ a constant for all firms } j \text{ in class } k. \tag{2}$$

The constants ρ_k (one for each of the k classes) can be given several economic interpretations: (a) From (2) we see that each ρ_k is the expected rate of return of any share in class k. (b) From (1) $1/\rho_k$ is the price which an investor has to pay for a dollar's worth of expected return in the class k. (c) Again from (1), by analogy with the terminology for perpetual bonds, ρ_k can be regarded as the market rate of capitalization for the expected value of the uncertain streams of the kind generated by the kth class of firms.[10]

B. *Debt Financing and Its Effects on Security Prices*

Having developed an apparatus for dealing with uncertain streams we can now approach the heart of the cost-of-capital problem by dropping the assumption that firms cannot issue bonds. The introduction of debt-financing changes the market for shares in a very fundamental way. Because firms may have different proportions of debt in their capi-

[9] Just what our classes of stocks contain and how the different classes can be identified by outside observers are empirical questions to which we shall return later. For the present, it is sufficient to observe: (1) Our concept of a class, while not identical to that of the industry is at least closely related to it. Certainly the basic characteristics of the probability distributions of the returns on assets will depend to a significant extent on the product sold and the technology used. (2) What are the appropriate class boundaries will depend on the particular problem being studied. An economist concerned with general tendencies in the market, for example, might well be prepared to work with far wider classes than would be appropriate for an investor planning his portfolio, or a firm planning its financial strategy.

[10] We cannot, on the basis of the assumptions so far, make any statements about the relationship or spread between the various ρ's or capitalization rates. Before we could do so we would have to make further specific assumptions about the way investors believe the probability distributions vary from class to class, as well as assumptions about investors' preferences as between the characteristics of different distributions.

tal structure, shares of different companies, even in the same class, can give rise to different probability distributions of returns. In the language of finance, the shares will be subject to different degrees of financial risk or "leverage" and hence they will no longer be perfect substitutes for one another.

To exhibit the mechanism determining the relative prices of shares under these conditions, we make the following two assumptions about the nature of bonds and the bond market, though they are actually stronger than is necessary and will be relaxed later: (1) All bonds (including any debts issued by households for the purpose of carrying shares) are assumed to yield a constant income per unit of time, and this income is regarded as certain by all traders regardless of the issuer. (2) Bonds, like stocks, are traded in a perfect market, where the term perfect is to be taken in its usual sense as implying that any two commodities which are perfect substitutes for each other must sell, in equilibrium, at the same price. It follows from assumption (1) that all bonds are in fact perfect substitutes up to a scale factor. It follows from assumption (2) that they must all sell at the same price per dollar's worth of return, or what amounts to the same thing must yield the same rate of return. This rate of return will be denoted by r and referred to as the rate of interest or, equivalently, as the capitalization rate for sure streams. We now can derive the following two basic propositions with respect to the valuation of securities in companies with different capital structures:

Proposition I. Consider any company j and let $\overline{X}_j$ stand as before for the expected return on the assets owned by the company (that is, its expected profit before deduction of interest). Denote by D_j the market value of the debts of the company; by S_j the market value of its common shares; and by $V_j \equiv S_j + D_j$ the market value of all its securities or, as we shall say, the market value of the firm. Then, our Proposition I asserts that we must have in equilibrium:

$$V_j \equiv (S_j + D_j) = \overline{X}_j/\rho_k, \text{ for any firm } j \text{ in class } k. \tag{3}$$

That is, the *market value of any firm is independent of its capital structure and is given by capitalizing its expected return at the rate ρ_k appropriate to its class.*

This proposition can be stated in an equivalent way in terms of the firm's "average cost of capital," $\overline{X}_j/V_j$, which is the ratio of its expected return to the market value of all its securities. Our proposition then is:

$$\frac{\overline{X}_j}{(S_j + D_j)} \equiv \frac{\overline{X}_j}{V_j} = \rho_k, \text{ for any firm } j, \text{ in class } k. \tag{4}$$

That is, *the average cost of capital to any firm is completely independent of* *its capital structure and is equal to the capitalization rate of a pure equity stream of its class.*

To establish Proposition I we will show that as long as the relations (3) or (4) do not hold between any pair of firms in a class, arbitrage will take place and restore the stated equalities. We use the term arbitrage advisedly. For if Proposition I did not hold, an investor could buy and sell stocks and bonds in such a way as to exchange one income stream for another stream, identical in all relevant respects but selling at a lower price. The exchange would therefore be advantageous to the investor quite independently of his attitudes toward risk.[11] As investors exploit these arbitrage opportunities, the value of the overpriced shares will fall and that of the underpriced shares will rise, thereby tending to eliminate the discrepancy between the market values of the firms.

By way of proof, consider two firms in the same class and assume for simplicity only, that the expected return, $\bar{X}$, is the same for both firms. Let company 1 be financed entirely with common stock while company 2 has some debt in its capital structure. Suppose first the value of the levered firm, V_2, to be larger than that of the unlevered one, V_1. Consider an investor holding s_2 dollars' worth of the shares of company 2, representing a fraction α of the total outstanding stock, S_2. The return from this portfolio, denoted by Y_2, will be a fraction α of the income available for the stockholders of company 2, which is equal to the total return X_2 less the interest charge, rD_2. Since under our assumption of homogeneity, the anticipated total return of company 2, X_2, is, under all circumstances, the same as the anticipated total return to company 1, X_1, we can hereafter replace X_2 and X_1 by a common symbol X. Hence, the return from the initial portfolio can be written as:

$$Y_2 = \alpha(X - rD_2). \tag{5}$$

Now suppose the investor sold his αS_2 worth of company 2 shares and acquired instead an amount $s_1 = \alpha(S_2 + D_2)$ of the shares of company 1. He could do so by utilizing the amount αS_2 realized from the sale of his initial holding and borrowing an additional amount αD_2 on his own credit, pledging his new holdings in company 1 as a collateral. He would thus secure for himself a fraction $s_1/S_1 = \alpha(S_2 + D_2)/S_1$ of the shares and earnings of company 1. Making proper allowance for the interest payments on his personal debt αD_2, the return from the new portfolio, Y_1, is given by:

[11] In the language of the theory of choice, the exchanges are movements from inefficient points in the interior to efficient points on the boundary of the investor's opportunity set; and not movements between efficient points along the boundary. Hence for this part of the analysis nothing is involved in the way of specific assumptions about investor attitudes or behavior other than that investors behave consistently and prefer more income to less income, *ceteris paribus*.

$$Y_1 = \frac{\alpha(S_2 + D_2)}{S_1} X - r\alpha D_2 = \alpha \frac{V_2}{V_1} X - r\alpha D_2. \tag{6}$$

Comparing (5) with (6) we see that as long as $V_2 > V_1$ we must have $Y_1 > Y_2$, so that it pays owners of company 2's shares to sell their holdings, thereby depressing S_2 and hence V_2; and to acquire shares of company 1, thereby raising S_1 and thus V_1. We conclude therefore that levered companies cannot command a premium over unlevered companies because investors have the opportunity of putting the equivalent leverage into their portfolio directly by borrowing on personal account.

Consider now the other possibility, namely that the market value of the levered company V_2 is less than V_1. Suppose an investor holds initially an amount s_1 of shares of company 1, representing a fraction α of the total outstanding stock, S_1. His return from this holding is:

$$Y_1 = \frac{s_1}{S_1} X = \alpha X.$$

Suppose he were to exchange this initial holding for another portfolio, also worth s_1, but consisting of s_2 dollars of stock of company 2 and of d dollars of bonds, where s_2 and d are given by:

$$s_2 = \frac{S_2}{V_2} s_1, \qquad d = \frac{D_2}{V_2} s_1. \tag{7}$$

In other words the new portfolio is to consist of stock of company 2 and of bonds in the proportions S_2/V_2 and D_2/V_2, respectively. The return from the stock in the new portfolio will be a fraction s_2/S_2 of the total return to stockholders of company 2, which is $(X - rD_2)$, and the return from the bonds will be rd. Making use of (7), the total return from the portfolio, Y_2, can be expressed as follows:

$$Y_2 = \frac{s_2}{S_2}(X - rD_2) + rd = \frac{s_1}{V_2}(X - rD_2) + r\frac{D_2}{V_2}s_1 = \frac{s_1}{V_2} X = \alpha \frac{S_1}{V_2} X$$

(since $s_1 = \alpha S_1$). Comparing Y_2 with Y_1 we see that, if $V_2 < S_1 \equiv V_1$, then Y_2 will exceed Y_1. Hence it pays the holders of company 1's shares to sell these holdings and replace them with a mixed portfolio containing an appropriate fraction of the shares of company 2.

The acquisition of a mixed portfolio of stock of a levered company j and of bonds in the proportion S_j/V_j and D_j/V_j respectively, may be regarded as an operation which "undoes" the leverage, giving access to an appropriate fraction of the unlevered return X_j. It is this possibility of undoing leverage which prevents the value of levered firms from being consistently less than those of unlevered firms, or more generally prevents the average cost of capital $\overline{X}_j/V_j$ from being systematically higher for levered than for nonlevered companies in the same class.

Since we have already shown that arbitrage will also prevent V_2 from being larger than V_1, we can conclude that in equilibrium we must have $V_2 = V_1$, as stated in Proposition I.

Proposition II. From Proposition I we can derive the following proposition concerning the rate of return on common stock in companies whose capital structure includes some debt: the expected rate of return or yield, i, on the stock of any company j belonging to the kth class is a linear function of leverage as follows:

$$i_j = \rho_k + (\rho_k - r) D_j/S_j. \tag{8}$$

That is, *the expected yield of a share of stock is equal to the appropriate capitalization rate ρ_k for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-to-equity ratio times the spread between ρ_k and r.* Or equivalently, the market price of any share of stock is given by capitalizing its expected return at the continuously variable rate i_j of (8).[12]

A number of writers have stated close equivalents of our Proposition I although by appealing to intuition rather than by attempting a proof and only to insist immediately that the results were not applicable to the actual capital markets.[13] Proposition II, however, so far as we have been able to discover is new.[14] To establish it we first note that, by definition, the expected rate of return, i, is given by:

$$i_j \equiv \frac{\overline{X}_j - rD_j}{S_j}. \tag{9}$$

From Proposition I, equation (3), we know that:

$$\overline{X}_j = \rho_k(S_j + D_j).$$

Substituting in (9) and simplifying, we obtain equation (8).

[12] To illustrate, suppose $\overline{X} = 1000$, $D = 4000$, $r = 5$ per cent and $\rho_k = 10$ per cent. These values imply that $V = 10{,}000$ and $S = 6000$ by virtue of Proposition I. The expected yield or rate of return per share is then:

$$i = \frac{1000 - 200}{6000} = .1 + (.1 - .05)\frac{4000}{6000} = 13\tfrac{1}{3} \text{ per cent.}$$

[13] See, for example, J. B. Williams [21, esp. pp. 72–73]; David Durand [3]; and W. A. Morton [15]. None of these writers describe in any detail the mechanism which is supposed to keep the average cost of capital constant under changes in capital structure. They seem, however, to be visualizing the equilibrating mechanism in terms of switches by investors between stocks and bonds as the yields of each get out of line with their "riskiness." This is an argument quite different from the pure arbitrage mechanism underlying our proof, and the difference is crucial. Regarding Proposition I as resting on investors' attitudes toward risk leads inevitably to a misunderstanding of many factors influencing relative yields such as, for example, limitations on the portfolio composition of financial institutions. See below, esp. Section I.D.

[14] Morton does make reference to a linear yield function but only "... for the sake of simplicity and because the particular function used makes no essential difference in my conclusions" [15, p. 443, note 2].

C. *Some Qualifications and Extensions of the Basic Propositions*

The methods and results developed so far can be extended in a number of useful directions, of which we shall consider here only three: (1) allowing for a corporate profits tax under which interest payments are deductible; (2) recognizing the existence of a multiplicity of bonds and interest rates; and (3) acknowledging the presence of market imperfections which might interfere with the process of arbitrage. The first two will be examined briefly in this section with some further attention given to the tax problem in Section II. Market imperfections will be discussed in Part D of this section in the course of a comparison of our results with those of received doctrines in the field of finance.

Effects of the Present Method of Taxing Corporations. The deduction of interest in computing taxable corporate profits will prevent the arbitrage process from making the value of all firms in a given class proportional to the expected returns generated by their physical assets. Instead, it can be shown (by the same type of proof used for the original version of Proposition I) that the market values of firms in each class must be proportional in equilibrium to their expected return net of taxes (that is, to the sum of the interest paid and expected net stockholder income). This means we must replace each $\bar{X}_j$ in the original versions of Propositions I and II with a new variable $\bar{X}_j^\tau$ representing the total income net of taxes generated by the firm:

$$\bar{X}_j^\tau \equiv (\bar{X}_j - rD_j)(1 - \tau) + rD_j \equiv \bar{\pi}_j^\tau + rD_j, \tag{10}$$

where $\bar{\pi}_j^\tau$ represents the expected net income accruing to the common stockholders and τ stands for the average rate of corporate income tax.[15]

After making these substitutions, the propositions, when adjusted for taxes, continue to have the same form as their originals. That is, Proposition I becomes:

$$\frac{\bar{X}_j^\tau}{V_j} = \rho_k^\tau, \text{ for any firm in class } k, \tag{11}$$

and Proposition II becomes

$$i_j \equiv \frac{\bar{\pi}_j^\tau}{S_j} = \rho_j^\tau + (\rho_k^\tau - r)D_j/S_j \tag{12}$$

where ρ_k^τ is the capitalization rate for income net of taxes in class k.

Although the form of the propositions is unaffected, certain interpretations must be changed. In particular, the after-tax capitalization rate

[15] For simplicity, we shall ignore throughout the tiny element of progression in our present corporate tax and treat τ as a constant independent of $(X_j - rD_j)$.

ρ_k^τ can no longer be identified with the "average cost of capital" which is $\rho_k = \overline{X}_j/V_j$. The difference between ρ_k^τ and the "true" average cost of capital, as we shall see, is a matter of some relevance in connection with investment planning within the firm (Section II). For the description of market behavior, however, which is our immediate concern here, the distinction is not essential. To simplify presentation, therefore, and to preserve continuity with the terminology in the standard literature we shall continue in this section to refer to ρ_k^τ as the average cost of capital, though strictly speaking this identification is correct only in the absence of taxes.

Effects of a Plurality of Bonds and Interest Rates. In existing capital markets we find not one, but a whole family of interest rates varying with maturity, with the technical provisions of the loan and, what is most relevant for present purposes, with the financial condition of the borrower.[16] Economic theory and market experience both suggest that the yields demanded by lenders tend to increase with the debt-equity ratio of the borrowing firm (or individual). If so, and if we can assume as a first approximation that this yield curve, $r = r\ (D/S)$, whatever its precise form, is the same for all borrowers, then we can readily extend our propositions to the case of a rising supply curve for borrowed funds.[17]

Proposition I is actually unaffected in form and interpretation by the fact that the rate of interest may rise with leverage; while the average cost of *borrowed* funds will tend to increase as debt rises, the average cost of funds from *all* sources will still be independent of leverage (apart from the tax effect). This conclusion follows directly from the ability of those who engage in arbitrage to undo the leverage in any financial structure by acquiring an appropriately mixed portfolio of bonds and stocks. Because of this ability, the ratio of earnings (*before* interest charges) to market value—*i.e.*, the average cost of capital from all

[16] We shall not consider here the extension of the analysis to encompass the time structure of interest rates. Although some of the problems posed by the time structure can be handled within our comparative statics framework, an adequate discussion would require a separate paper.

[17] We can also develop a theory of bond valuation along lines essentially parallel to those followed for the case of shares. We conjecture that the curve of bond yields as a function of leverage will turn out to be a nonlinear one in contrast to the linear function of leverage developed for common shares. However, we would also expect that the rate of increase in the yield on new issues would not be substantial in practice. This relatively slow rise would reflect the fact that interest rate increases by themselves can never be completely satisfactory to creditors as compensation for their increased risk. Such increases may simply serve to raise r so high relative to ρ that they become self-defeating by giving rise to a situation in which even normal fluctuations in earnings may force the company into bankruptcy. The difficulty of borrowing more, therefore, tends to show up in the usual case not so much in higher rates as in the form of increasingly stringent restrictions imposed on the company's management and finances by the creditors; and ultimately in a complete inability to obtain new borrowed funds, at least from the institutional investors who normally set the standards in the market for bonds.

sources—must be the same for all firms in a given class.[18] In other words, the increased cost of borrowed funds as leverage increases will tend to be offset by a corresponding reduction in the yield of common stock. This seemingly paradoxical result will be examined more closely below in connection with Proposition II.

A significant modification of Proposition I would be required only if the yield curve $r=r(D/S)$ were different for different borrowers, as might happen if creditors had marked preferences for the securities of a particular class of debtors. If, for example, corporations as a class were able to borrow at lower rates than individuals having equivalent personal leverage, then the average cost of capital to corporations might fall slightly, as leverage increased over some range, in reflection of this differential. In evaluating this possibility, however, remember that the relevant interest rate for our arbitrage operators is the rate on brokers' loans and, historically, that rate has not been noticeably higher than representative corporate rates.[19] The operations of holding companies and investment trusts which can borrow on terms comparable to operating companies represent still another force which could be expected to wipe out any marked or prolonged advantages from holding levered stocks.[20]

Although Proposition I remains unaffected as long as the yield curve is the same for all borrowers, the relation between common stock yields and leverage will no longer be the strictly linear one given by the original Proposition II. If r increases with leverage, the yield i will still tend to

[18] One normally minor qualification might be noted. Once we relax the assumption that all bonds have certain yields, our arbitrage operator faces the danger of something comparable to "gambler's ruin." That is, there is always the possibility that an otherwise sound concern—one whose long-run expected income is greater than its interest liability—might be forced into liquidation as a result of a run of temporary losses. Since reorganization generally involves costs, and because the operation of the firm may be hampered during the period of reorganization with lasting unfavorable effects on earnings prospects, we might perhaps expect heavily levered companies to sell at a slight discount relative to less heavily indebted companies of the same class.

[19] Under normal conditions, moreover, a substantial part of the arbitrage process could be expected to take the form, not of having the arbitrage operators go into debt on personal account to put the required leverage into their portfolios, but simply of having them reduce the amount of corporate bonds they already hold when they acquire underpriced unlevered stock. Margin requirements are also somewhat less of an obstacle to maintaining any desired degree of leverage in a portfolio than might be thought at first glance. Leverage could be largely restored in the face of higher margin requirements by switching to stocks having more leverage at the corporate level.

[20] An extreme form of inequality between borrowing and lending rates occurs, of course, in the case of preferred stocks, which can not be directly issued by individuals on personal account. Here again, however, we would expect that the operations of investment corporations plus the ability of arbitrage operators to sell off their holdings of preferred stocks would act to prevent the emergence of any substantial premiums (for this reason) on capital structures containing preferred stocks. Nor are preferred stocks so far removed from bonds as to make it impossible for arbitrage operators to approximate closely the risk and leverage of a corporate preferred stock by incurring a somewhat smaller debt on personal account.

rise as D/S increases, but at a decreasing rather than a constant rate. Beyond some high level of leverage, depending on the exact form of the interest function, the yield may even start to fall.[21] The relation between i and D/S could conceivably take the form indicated by the curve MD

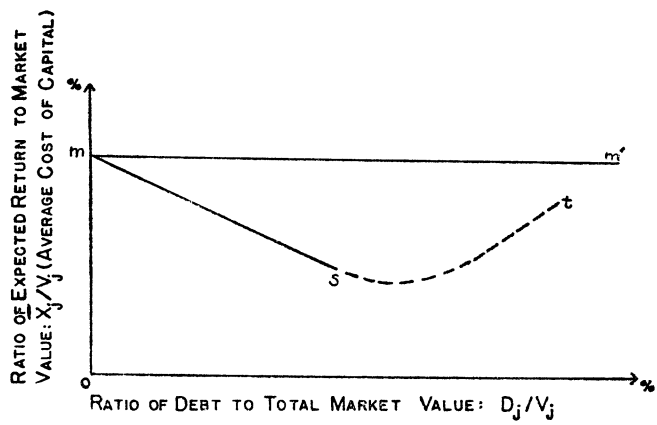

FIGURE 1

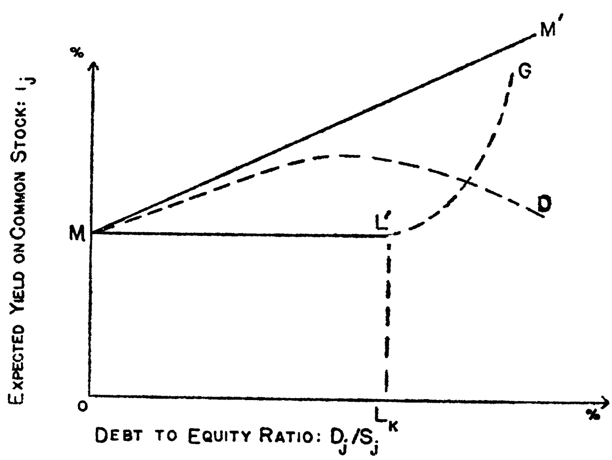

FIGURE 2

in Figure 2, although in practice the curvature would be much less pronounced. By contrast, with a constant rate of interest, the relation would be linear throughout as shown by line MM', Figure 2.

The downward sloping part of the curve MD perhaps requires some

[21] Since new lenders are unlikely to permit this much leverage (*cf.* note 17), this range of the curve is likely to be occupied by companies whose earnings prospects have fallen substantially since the time when their debts were issued.

comment since it may be hard to imagine why investors, other than those who like lotteries, would purchase stocks in this range. Remember, however, that the yield curve of Proposition II is a consequence of the more fundamental Proposition I. Should the demand by the risk-lovers prove insufficient to keep the market to the peculiar yield-curve *MD*, this demand would be reinforced by the action of arbitrage operators. The latter would find it profitable to own a pro-rata share of the firm as a whole by holding its stock *and* bonds, the lower yield of the shares being thus offset by the higher return on bonds.

D. *The Relation of Propositions I and II to Current Doctrines*

The propositions we have developed with respect to the valuation of firms and shares appear to be substantially at variance with current doctrines in the field of finance. The main differences between our view and the current view are summarized graphically in Figures 1 and 2. Our Proposition I [equation (4)] asserts that the average cost of capital, $\bar{X}_j^\tau/V_j$, is a constant for all firms j in class k, independently of their financial structure. This implies that, if we were to take a sample of firms in a given class, and if for each firm we were to plot the ratio of expected return to market value against some measure of leverage or financial structure, the points would tend to fall on a horizontal straight line with intercept ρ_k^τ, like the solid line mm' in Figure 1.[22] From Proposition I we derived Proposition II [equation (8)] which, taking the simplest version with r constant, asserts that, for all firms in a class, the relation between the yield on common stock and financial structure, measured by D_j/S_j, will approximate a straight line with slope $(\rho_k^\tau - r)$ and intercept ρ_k^τ. This relationship is shown as the solid line MM' in Figure 2, to which reference has been made earlier.[23]

By contrast, the conventional view among finance specialists appears to start from the proposition that, other things equal, the earnings-price ratio (or its reciprocal, the times-earnings multiplier) of a firm's common stock will normally be only slightly affected by "moderate" amounts of debt in the firm's capital structure.[24] Translated into our no-

[22] In Figure 1 the measure of leverage used is D_j/V_j (the ratio of debt to market value) rather than D_j/S_j (the ratio of debt to equity), the concept used in the analytical development. The D_j/V_j measure is introduced at this point because it simplifies comparison and contrast of our view with the traditional position.

[23] The line MM' in Figure 2 has been drawn with a positive slope on the assumption that $\rho_k^\tau > r$, a condition which will normally obtain. Our Proposition II as given in equation (8) would continue to be valid, of course, even in the unlikely event that $\rho_k^\tau < r$, but the slope of MM' would be negative.

[24] See, *e.g.*, Graham and Dodd [6, pp. 464–66]. Without doing violence to this position, we can bring out its implications more sharply by ignoring the qualification and treating the yield as a virtual constant over the relevant range. See in this connection the discussion in Durand [3, esp. pp. 225–37] of what he calls the "net income method" of valuation.

tation, it asserts that for any firm j in the class k,

$$\frac{\overline{X}_j^\tau - rD_j}{S_j} \equiv \frac{\bar{\pi}_j^\tau}{S_j} = i_k^*, \text{ a constant for } \frac{D_j}{S_j} \leq L_k \tag{13}$$

or, equivalently,

$$S_j = \bar{\pi}_j^\tau / i_k^*. \tag{14}$$

Here i_k^* represents the capitalization rate or earnings-price ratio on the common stock and L_k denotes some amount of leverage regarded as the maximum "reasonable" amount for firms of the class k. This assumed relationship between yield and leverage is the horizontal solid line ML' of Figure 2. Beyond L', the yield will presumably rise sharply as the market discounts "excessive" trading on the equity. This possibility of a rising range for high leverages is indicated by the broken-line segment $L'G$ in the figure.[25]

If the value of shares were really given by (14) then the over-all market value of the firm must be:

$$V_j \equiv S_j + D_j = \frac{\overline{X}_j^\tau - rD_j}{i_k^*} + D_j = \frac{\overline{X}_j^\tau}{i_k^*} + \frac{(i_k^* - r)D_j}{i_k^*}. \tag{16}$$

That is, for any given level of expected total returns after taxes ($\overline{X}_j^\tau$) and assuming, as seems natural, that $i_k^* > r$, the value of the firm must tend to *rise* with debt;[26] whereas our Proposition I asserts that the value of the firm is completely independent of the capital structure. Another way of contrasting our position with the traditional one is in terms of the cost of capital. Solving (16) for $\overline{X}_j^\tau / V_j$ yields:

$$\overline{X}_j^\tau / V_j = i_k^* - (i_k^* - r) D_j / V_j. \tag{17}$$

According to this equation, the average cost of capital is not independent of capital structure as we have argued, but should tend to *fall* with increasing leverage, at least within the relevant range of moderate debt ratios, as shown by the line ms in Figure 1. Or to put it in more familiar terms, debt-financing should be "cheaper" than equity-financing if not carried too far.

When we also allow for the possibility of a rising range of stock yields for large values of leverage, we obtain a U-shaped curve like mst in

[25] To make it easier to see some of the implications of this hypothesis as well as to prepare the ground for later statistical testing, it will be helpful to assume that the notion of a critical limit on leverage beyond which yields rise rapidly, can be epitomized by a quadratic relation of the form:

$$\bar{\pi}_j^\tau / S_j = i_k^* + \beta(D_j/S_j) + \alpha(D_j/S_j)^2, \qquad \alpha > 0. \tag{15}$$

[26] For a typical discussion of how a promoter can, supposedly, increase the market value of a firm by recourse to debt issues, see W. J. Eiteman [4, esp. pp. 11–13].

Figure 1.[27] That a yield-curve for stocks of the form $ML'G$ in Figure 2 implies a U-shaped cost-of-capital curve has, of course, been recognized by many writers. A natural further step has been to suggest that the capital structure corresponding to the trough of the U is an "optimal capital structure" towards which management ought to strive in the best interests of the stockholders.[28] According to our model, by contrast, no such optimal structure exists—all structures being equivalent from the point of view of the cost of capital.

Although the falling, or at least U-shaped, cost-of-capital function is in one form or another the dominant view in the literature, the ultimate rationale of that view is by no means clear. The crucial element in the position—that the expected earnings-price ratio of the stock is largely unaffected by leverage up to some conventional limit—is rarely even regarded as something which requires explanation. It is usually simply taken for granted or it is merely asserted that this is the way the market behaves.[29] To the extent that the constant earnings-price ratio has a rationale at all we suspect that it reflects in most cases the feeling that moderate amounts of debt in "sound" corporations do not really add very much to the "riskiness" of the stock. Since the extra risk is slight, it seems natural to suppose that firms will not have to pay noticeably higher yields in order to induce investors to hold the stock.[30]

A more sophisticated line of argument has been advanced by David Durand [3, pp. 231–33]. He suggests that because insurance companies and certain other important institutional investors are restricted to debt securities, nonfinancial corporations are able to borrow from them at interest rates which are lower than would be required to compensate

[27] The U-shaped nature of the cost-of-capital curve can be exhibited explicitly if the yield curve for shares as a function of leverage can be approximated by equation (15) of footnote 25. From that equation, multiplying both sides by S_j we obtain: $\bar{\pi}_j^\tau = \bar{X}_j^\tau - rD_j = i_k^* S_j + \beta D_j + \alpha D_j^2 / S_j$ or, adding and subtracting $i_k^* D_k$ from the right-hand side and collecting terms,

$$\bar{X}_j^\tau = i_k^*(S_j + D_j) + (\beta + r - i_k^*)D_j + \alpha D^2{}_j / S_j. \tag{18}$$

Dividing (18) by V_j gives an expression for the cost of capital:

$$\begin{aligned} \bar{X}_j^\tau / V_j = i_k^* - (i_k^* - r - \beta) D_j / V_j + \alpha D_j^2 / S_j V_j = i_k^* - (i_k^* - r - \beta) D_j / V_j \\ + \alpha (D_j / V_j)^2 / (1 - D_j / V_j) \end{aligned} \tag{19}$$

which is clearly U-shaped since α is supposed to be positive.

[28] For a typical statement see S. M. Robbins [16, p. 307]. See also Graham and Dodd [6, pp. 468–74].

[29] See *e.g.*, Graham and Dodd [6, p. 466].

[30] A typical statement is the following by Guthmann and Dougall [7, p. 245]: "Theoretically it might be argued that the increased hazard from using bonds and preferred stocks would counterbalance this additional income and so prevent the common stock from being more attractive than when it had a lower return but fewer prior obligations. In practice, the extra earnings from 'trading on the equity' are often regarded by investors as more than sufficient to serve as a 'premium for risk' when the proportions of the several securities are judiciously mixed."

creditors in a free market. Thus, while he would presumably agree with our conclusions that stockholders could not gain from leverage in an unconstrained market, he concludes that they can gain under present institutional arrangements. This gain would arise by virtue of the "safety superpremium" which lenders are willing to pay corporations for the privilege of lending.[31]

The defective link in both the traditional and the Durand version of the argument lies in the confusion between investors' subjective risk preferences and their objective market opportunities. Our Propositions I and II, as noted earlier, do not depend for their validity on any assumption about individual risk preferences. Nor do they involve any assertion as to what is an adequate compensation to investors for assuming a given degree of risk. They rely merely on the fact that a given commodity cannot consistently sell at more than one price in the market; or more precisely that the price of a commodity representing a "bundle" of two other commodities cannot be consistently different from the weighted average of the prices of the two components (the weights being equal to the proportion of the two commodities in the bundle).

An analogy may he helpful at this point. The relations between $1/\rho_k$, the price per dollar of an unlevered stream in class k; $1/r$, the price per dollar of a sure stream, and $1/i_j$, the price per dollar of a levered stream j, in the kth class, are essentially the same as those between, respectively, the price of whole milk, the price of butter fat, and the price of milk which has been thinned out by skimming off some of the butter fat. Our Proposition I states that a firm cannot reduce the cost of capital—*i.e.*, increase the market value of the stream it generates—by securing part of its capital through the sale of bonds, even though debt money appears to be cheaper. This assertion is equivalent to the proposition that, under perfect markets, a dairy farmer cannot in general earn more for the milk he produces by skimming some of the butter fat and selling it separately, even though butter fat per unit weight, sells for more than whole milk. The advantage from skimming the milk rather than selling whole milk would be purely illusory; for what would be gained from selling the high-priced butter fat would be lost in selling the low-priced residue of thinned milk. Similarly our Proposition II—that the price per dollar of a levered stream falls as leverage increases—is an ex-

[31] Like Durand, Morton [15] contends "that the actual market deviates from [Proposition I] by giving a changing over-all cost of money at different points of the [leverage] scale" (p. 443, note 2, inserts ours), but the basis for this contention is nowhere clearly stated. Judging by the great emphasis given to the lack of mobility of investment funds between stocks and bonds and to the psychological and institutional pressures toward debt portfolios (see pp. 444–51 and especially his discussion of the optimal capital structure on p. 453) he would seem to be taking a position very similar to that of Durand above.

act analogue of the statement that the price per gallon of thinned milk falls continuously as more butter fat is skimmed off.[32]

It is clear that this last assertion is true as long as butter fat is worth more per unit weight than whole milk, and it holds even if, for many consumers, taking a little cream out of the milk (adding a little leverage to the stock) does not detract noticeably from the taste (does not add noticeably to the risk). Furthermore the argument remains valid even in the face of instituional limitations of the type envisaged by Durand. For suppose that a large fraction of the population habitually dines in restaurants which are required by law to serve only cream in lieu of milk (entrust their savings to institutional investors who can only buy bonds). To be sure the price of butter fat will then tend to be higher in relation to that of skimmed milk than in the absence such restrictions (the rate of interest will tend to be lower), and this will benefit people who eat at home and who like skim milk (who manage their own portfolio and are able and willing to take risk). But it will still be the case that a farmer cannot gain by skimming some of the butter fat and selling it separately (firm cannot reduce the cost of capital by recourse to borrowed funds).[33]

Our propositions can be regarded as the extension of the classical theory of markets to the particular case of the capital markets. Those who hold the current view—whether they realize it or not—must as-

[32] Let M denote the quantity of whole milk, B/M the proportion of butter fat in the whole milk, and let p_M, p_B and p_α denote, respectively, the price per unit weight of whole milk, butter fat and thinned milk from which a fraction α of the butter fat has been skimmed off. We then have the fundamental perfect market relation:

$$\text{(a)} \qquad p_\alpha(M - \alpha B) + p_B\alpha B = p_M M, \qquad 0 \leq \alpha \leq 1,$$

stating that total receipts will be the same amount $p_M M$, independently of the amount αB of butter fat that may have been sold separately. Since p_M corresponds to $1/\rho$, p_B to $1/r$, p_α to $1/i$, M to $\bar{X}$ and αB to rD, (a) is equivalent to Proposition I, $S+D=\bar{X}/\rho$. From (a) we derive:

$$\text{(b)} \qquad p_\alpha = p_M \frac{M}{M - \alpha B} - p_B \frac{\alpha B}{M - \alpha B}$$

which gives the price of thinned milk as an explicit function of the proportion of butter fat skimmed off; the function decreasing as long as $p_B > p_M$. From (a) also follows:

$$\text{(c)} \qquad 1/p_\alpha = 1/p_M + (1/p_M - 1/p_B) \frac{p_B \alpha B}{p_\alpha(M - \alpha B)}$$

which is the exact analogue of Proposition II, as given by (8).

[33] The reader who likes parables will find that the analogy with interrelated commodity markets can be pushed a good deal farther than we have done in the text. For instance, the effect of changes in the market rate of interest on the over-all cost of capital is the same as the effect of a change in the price of butter on the price of whole milk. Similarly, just as the relation between the prices of skim milk and butter fat influences the kind of cows that will be reared, so the relation between i and r influences the kind of ventures that will be undertaken. If people like butter we shall have Guernseys; if they are willing to pay a high price for safety, this will encourage ventures which promise smaller but less uncertain streams per dollar of physical assets.

sume not merely that there are lags and frictions in the equilibrating process—a feeling we certainly share,[34] claiming for our propositions only that they describe the central tendency around which observations will scatter—but also that there are large and *systematic* imperfections in the market which permanently bias the outcome. This is an assumption that economists, at any rate, will instinctively eye with some skepticism.

In any event, whether such prolonged, systematic departures from equilibrium really exist or whether our propositions are better descriptions of long-run market behavior can be settled only by empirical research. Before going on to the theory of investment it may be helpful, therefore, to look at the evidence.

E. *Some Preliminary Evidence on the Basic Propositions*

Unfortunately the evidence which has been assembled so far is amazingly skimpy. Indeed, we have been able to locate only two recent studies—and these of rather limited scope—which were designed to throw light on the issue. Pending the results of more comprehensive tests which we hope will soon be available, we shall review briefly such evidence as is provided by the two studies in question: (1) an analysis of the relation between security yields and financial structure for some 43 large electric utilities by F. B. Allen [1], and (2) a parallel (unpublished) study by Robert Smith [19], for 42 oil companies designed to test whether Allen's rather striking results would be found in an industry with very different characteristics.[35] The Allen study is based on average figures for the years 1947 and 1948, while the Smith study relates to the single year 1953.

The Effect of Leverage on the Cost of Capital. According to the received view, as shown in equation (17) the average cost of capital, $\overline{X}^\tau/V$, should decline linearly with leverage as measured by the ratio D/V, at least through most of the relevant range.[36] According to Proposition I, the average cost of capital within a given class k should tend to have the same value ρ_k^τ independently of the degree of leverage. A simple test

[34] Several specific examples of the failure of the arbitrage mechanism can be found in Graham and Dodd [6, *e.g.*, pp. 646–48]. The price discrepancy described on pp. 646–47 is particularly curious since it persists even today despite the fact that a whole generation of security analysts has been brought up on this book!

[35] We wish to express our thanks to both writers for making available to us some of their original worksheets. In addition to these recent studies there is a frequently cited (but apparently seldom read) study by the Federal Communications Commission in 1938 [22] which purports to show the existence of an optimal capital structure or range of structures (in the sense defined above) for public utilities in the 1930's. By current standards for statistical investigations, however, this study cannot be regarded as having any real evidential value for the problem at hand.

[36] We shall simplify our notation in this section by dropping the subscript j used to denote a particular firm wherever this will not lead to confusion.

of the merits of the two alternative hypotheses can thus be carried out by correlating $\bar{X}^\tau/V$ with D/V. If the traditional view is correct, the correlation should be significantly negative; if our view represents a better approximation to reality, then the correlation should not be significantly different from zero.

Both studies provide information about the average value of D—the market value of bonds and preferred stock—and of V—the market value of all securities.[37] From these data we can readily compute the ratio D/V and this ratio (expressed as a percentage) is represented by the symbol d in the regression equations below. The measurement of the variable $\bar{X}^\tau/V$, however, presents serious difficulties. Strictly speaking, the numerator should measure the expected returns net of taxes, but this is a variable on which no direct information is available. As an approximation, we have followed both authors and used (1) the average value of actual net returns in 1947 and 1948 for Allen's utilities; and (2) actual net returns in 1953 for Smith's oil companies. Net return is defined in both cases as the sum of interest, preferred dividends and stockholders' income net of corporate income taxes. Although this approximation to expected returns is undoubtedly very crude, there is no reason to believe that it will systematically bias the test in so far as the sign of the regression coefficient is concerned. The roughness of the approximation, however, will tend to make for a wide scatter. Also contributing to the scatter is the crudeness of the industrial classification, since especially within the sample of oil companies, the assumption that all the firms belong to the same class in our sense, is at best only approximately valid.

Denoting by x our approximation to $\bar{X}^\tau/V$ (expressed, like d, as a percentage), the results of the tests are as follows:

$$\text{Electric Utilities} \quad x = 5.3 + \underset{(\pm .008)}{.006d} \qquad r = .12$$

$$\text{Oil Companies} \quad x = 8.5 + \underset{(\pm .024)}{.006d} \qquad r = .04.$$

The data underlying these equations are also shown in scatter diagram form in Figures 3 and 4.

The results of these tests are clearly favorable to our hypothesis.

[37] Note that for purposes of this test preferred stocks, since they represent an *expected* fixed obligation, are properly classified with bonds even though the tax status of preferred dividends is different from that of interest payments and even though preferred dividends are really fixed only as to their maximum in any year. Some difficulty of classification does arise in the case of convertible preferred stocks (and convertible bonds) selling at a substantial premium, but fortunately very few such issues were involved for the companies included in the two studies. Smith included bank loans and certain other short-term obligations (at book values) in his data on oil company debts and this treatment is perhaps open to some question. However, the amounts involved were relatively small and check computations showed that their elimination would lead to only minor differences in the test results.

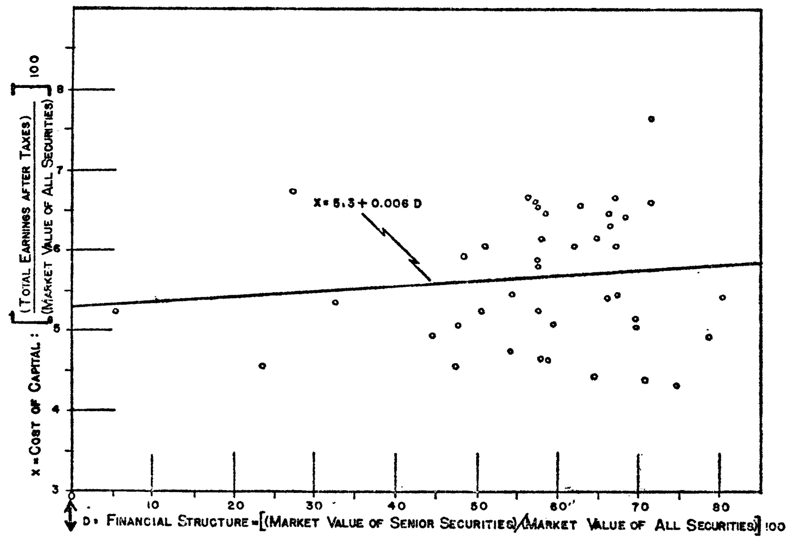

FIGURE 3. COST OF CAPITAL IN RELATION TO FINANCIAL STRUCTURE FOR 43 ELECTRIC UTILITIES, 1947–48

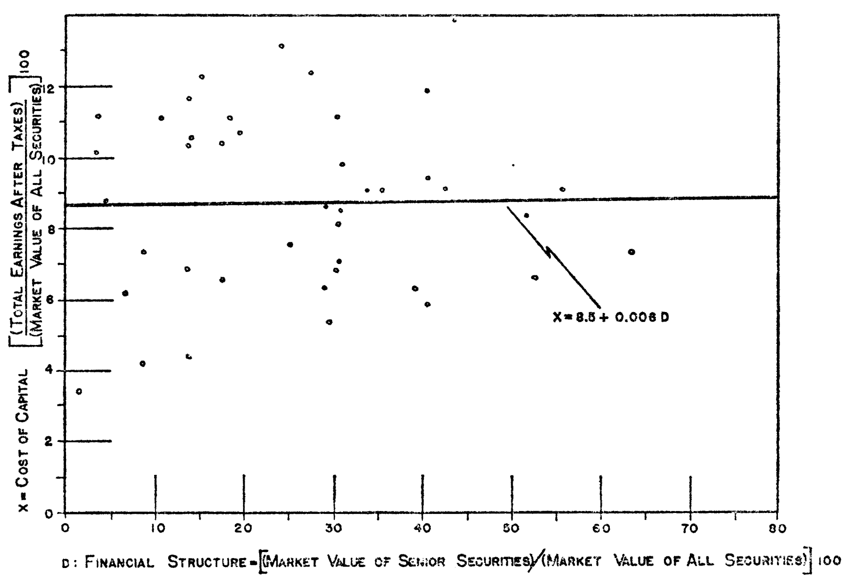

FIGURE 4. COST OF CAPITAL IN RELATION TO FINANCIAL STRUCTURE FOR 42 OIL COMPANIES, 1953

Both correlation coefficients are very close to zero and not statistically significant. Furthermore, the implications of the traditional view fail to be supported even with respect to the sign of the correlation. The data in short provide no evidence of any tendency for the cost of capital to fall as the debt ratio increases.[38]

It should also be apparent from the scatter diagrams that there is no hint of a curvilinear, U-shaped, relation of the kind which is widely believed to hold between the cost of capital and leverage. This graphical impression was confirmed by statistical tests which showed that for both industries the curvature was not significantly different from zero, its sign actually being opposite to that hypothesized.[39]

Note also that according to our model, the constant terms of the regression equations are measures of ρ_k^{τ}, the capitalization rates for unlevered streams and hence the average cost of capital in the classes in question. The estimates of 8.5 per cent for the oil companies as against 5.3 per cent for electric utilities appear to accord well with a priori expectations, both in absolute value and relative spread.

The Effect of Leverage on Common Stock Yields. According to our Proposition II—see equation 12 and Figure 2—the expected yield on common stock, $\bar{\pi}^{\tau}/S$, in any given class, should tend to increase with leverage as measured by the ratio D/S. The relation should tend to be linear and with positive slope through most of the relevant range (as in the curve MM' of Figure 2), though it might tend to flatten out if we move

[38] It may be argued that a test of the kind used is biased against the traditional view. The fact that both sides of the regression equation are divided by the variable V which may be subject to random variation might tend to impart a positive bias to the correlation. As a check on the results presented in the text, we have, therefore, carried out a supplementary test based on equation (16). This equation shows that, if the traditional view is correct, the market value of a company should, for given $\bar{X}^{\tau}$, increase with debt through most of the relevant range; according to our model the market value should be uncorrelated with D, given $\bar{X}^{\tau}$. Because of wide variations in the size of the firms included in our samples, all variables must be divided by a suitable scale factor in order to avoid spurious results in carrying out a test of equation (16). The factor we have used is the book value of the firm denoted by A. The hypothesis tested thus takes the specific form:

$$V/A = a + b(\bar{X}^{\tau}/A) + c(D/A)$$

and the numerator of the ratio X^{τ}/A is again approximated by actual net returns. The partial correlation between V/A and D/A should now be positive according to the traditional view and zero according to our model. Although division by A should, if anything, bias the results in favor of the traditional hypothesis, the partial correlation turns out to be only .03 for the oil companies and $-.28$ for the electric utilities. Neither of these coefficients is significantly different from zero and the larger one even has the wrong sign.

[39] The tests consisted of fitting to the data the equation (19) of footnote 27. As shown there, it follows from the U-shaped hypothesis that the coefficient α of the variable $(D/V)^2/(1-D/V)$, denoted hereafter by d^*, should be significant and positive. The following regression equations and partials were obtained:

Electric Utilities $x = 5.0 + .017d - .003d^*;\ r_{xd^*.d} = -.15$

Oil Companies $x = 8.0 + .05d - .03d^*;\ r_{xd^*.d} = -.14.$

far enough to the right (as in the curve MD'), to the extent that high leverage tends to drive up the cost of senior capital. According to the conventional view, the yield curve as a function of leverage should be a horizontal straight line (like ML') through most of the relevant range; far enough to the right, the yield may tend to rise at an increasing rate. Here again, a straight-forward correlation—in this case between $\bar{\pi}^\tau/S$ and D/S—can provide a test of the two positions. If our view is correct, the correlation should be significantly positive; if the traditional view is correct, the correlation should be negligible.

Subject to the same qualifications noted above in connection with $\bar{X}^\tau$, we can approximate $\bar{\pi}^\tau$ by actual stockholder net income.[40] Letting z denote in each case the approximation to $\bar{\pi}^\tau/S$ (expressed as a percentage) and letting h denote the ratio D/S (also in percentage terms) the following results are obtained:

$$\text{Electric Utilities} \quad z = 6.6 + \underset{(+.004)}{.017h} \qquad r = .53$$

$$\text{Oil Companies} \quad z = 8.9 + \underset{(\pm .012)}{.051h} \qquad r = .53.$$

These results are shown in scatter diagram form in Figures 5 and 6.

Here again the implications of our analysis seem to be borne out by the data. Both correlation coefficients are positive and highly significant when account is taken of the substantial sample size. Furthermore, the estimates of the coefficients of the equations seem to accord reasonably well with our hypothesis. According to equation (12) the constant term should be the value of ρ_k^τ for the given class while the slope should be $(\rho_k^\tau - r)$. From the test of Proposition I we have seen that for the oil companies the mean value of ρ_k^τ could be estimated at around 8.7. Since the average yield of senior capital during the period covered was in the order of $3\frac{1}{2}$ per cent, we should expect a constant term of about 8.7 per cent and a slope of just over 5 per cent. These values closely approximate the regression estimates of 8.9 per cent and 5.1 per cent respectively. For the electric utilities, the yield of senior capital was also on the order of $3\frac{1}{2}$ per cent during the test years, but since the estimate of the mean value of ρ_k^τ from the test of Proposition I was 5.6 per cent,

[40] As indicated earlier, Smith's data were for the single year 1953. Since the use of a single year's profits as a measure of expected profits might be open to objection we collected profit data for 1952 for the same companies and based the computation of $\bar{\pi}^\tau/S$ on the average of the two years. The value of $\bar{\pi}^\tau/S$ was obtained from the formula:

$$\left(\text{net earnings in 1952}\cdot\frac{\text{assets in '53}}{\text{assets in '52}} + \text{net earnings in '1953}\right)\frac{1}{2}$$
$$\div \text{ (average market value of common stock in '53).}$$

The asset adjustment was introduced as rough allowance for the effects of possible growth in the size of the firm. It might be added that the correlation computed with $\bar{\pi}^\tau/S$ based on net profits in 1953 alone was found to be only slightly smaller, namely .50.

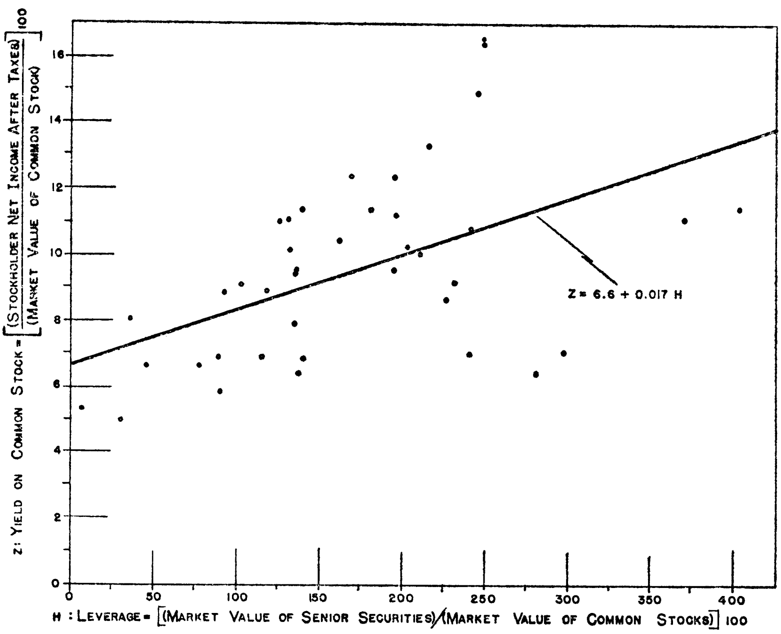

Figure 5. Yield on Common Stock in Relation to Leverage for 43 Electric Utilities, 1947–48

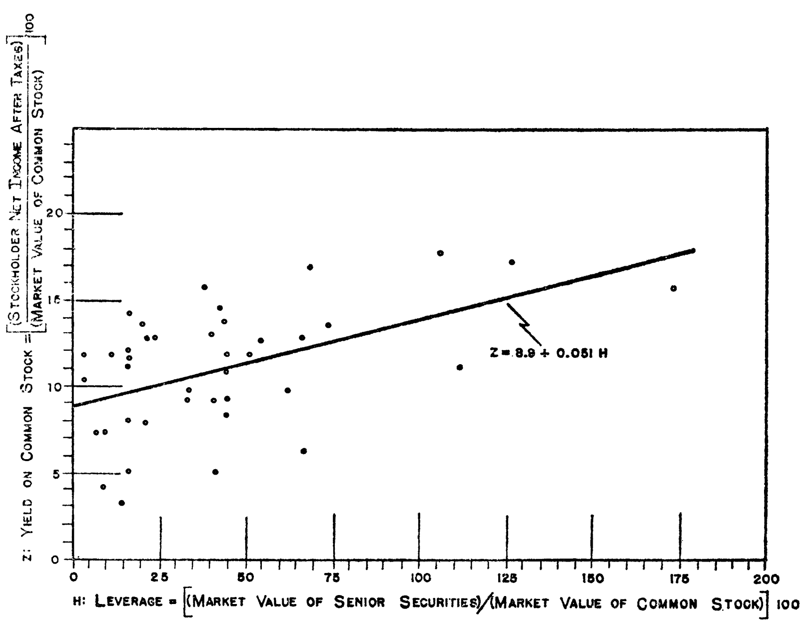

Figure 6. Yield on Common Stock in Relation to Leverage for 42 Oil Companies, 1952–53

the slope should be just above 2 per cent. The actual regression estimate for the slope of 1.7 per cent is thus somewhat low, but still within one standard error of its theoretical value. Because of this underestimate of the slope and because of the large mean value of leverage ($\bar{h}=160$ per cent) the regression estimate of the constant term, 6.6 per cent, is somewhat high, although not significantly different from the value of 5.6 per cent obtained in the test of Proposition I.

When we add a square term to the above equations to test for the presence and direction of curvature we obtain the following estimates:

$$\text{Electric Utilities} \quad z = 4.6 + .004h - .007h^2$$

$$\text{Oil Companies} \quad z = 8.5 + .072h - .016h^2.$$

For both cases the curvature is negative. In fact, for the electric utilities, where the observations cover a wider range of leverage ratios, the negative coefficient of the square term is actually significant at the 5 per cent level. Negative curvature, as we have seen, runs directly counter to the traditional hypothesis, whereas it can be readily accounted for by our model in terms of rising cost of borrowed funds.[41]

In summary, the empirical evidence we have reviewed seems to be broadly consistent with our model and largely inconsistent with traditional views. Needless to say much more extensive testing will be required before we can firmly conclude that our theory describes market behavior. Caution is indicated especially with regard to our test of Proposition II, partly because of possible statistical pitfalls[42] and partly because not all the factors that might have a systematic effect on stock yields have been considered. In particular, no attempt was made to test the possible influence of the dividend pay-out ratio whose role has tended to receive a great deal of attention in current research and thinking. There are two reasons for this omission. First, our main objective has been to assess the prima facie tenability of *our* model, and in this model, based as it is on rational behavior by investors, dividends per se play no role. Second, in a world in which the policy of dividend stabilization is widespread, there is no simple way of disentangling the true effect of dividend payments on stock prices from their apparent effect,

[41] That the yield of senior capital tended to rise for utilities as leverage increased is clearly shown in several of the scatter diagrams presented in the published version of Allen's study. This significant negative curvature between stock yields and leverage for utilities may be partly responsible for the fact, previously noted, that the constant in the linear regression is somewhat higher and the slope somewhat lower than implied by equation (12). Note also in connection with the estimate of $\rho_k{}^\tau$ that the introduction of the quadratic term reduces the constant considerably, pushing it in fact below the a priori expectation of 5.6, though the difference is again not statistically significant.

[42] In our test, *e.g.*, the two variables z and h are both ratios with S appearing in the denominator, which may tend to impart a positive bias to the correlation (*cf.* note 38). Attempts were made to develop alternative tests, but although various possibilities were explored, we have so far been unable to find satisfactory alternatives.

the latter reflecting only the role of dividends as a proxy measure of long-term earning anticipations.[43] The difficulties just mentioned are further compounded by possible interrelations between dividend policy and leverage.[44]

II. *Implications of the Analysis for the Theory of Investment*

A. *Capital Structure and Investment Policy*

On the basis of our propositions with respect to cost of capital and financial structure (and for the moment neglecting taxes), we can derive the following simple rule for optimal investment policy by the firm:

Proposition III. If a firm in class k is acting in the best interest of the stockholders at the time of the decision, it will exploit an investment opportunity if and only if the rate of return on the investment, say ρ^*, is as large as or larger than ρ_k. That is, *the cut-off point for investment in the firm will in all cases be ρ_k and will be completely unaffected by the type of security used to finance the investment.* Equivalently, we may say that regardless of the financing used, the marginal cost of capital to a firm is equal to the average cost of capital, which is in turn equal to the capitalization rate for an unlevered stream in the class to which the firm belongs.[45]

To establish this result we will consider the three major financing alternatives open to the firm—bonds, retained earnings, and common stock issues—and show that in each case an investment is worth undertaking if, and only if, $\rho^* \geqq \rho_k$.[46]

Consider first the case of an investment financed by the sale of bonds. We know from Proposition I that the market value of the firm before the investment was undertaken was:[47]

$$V_0 = \overline{X}_0/\rho_k \tag{20}$$

[43] We suggest that failure to appreciate this difficulty is responsible for many fallacious, or at least unwarranted, conclusions about the role of dividends.

[44] In the sample of electric utilities, there is a substantial negative correlation between yields and pay-out ratios, but also between pay-out ratios and leverage, suggesting that either the association of yields and leverage or of yields and pay-out ratios may be (at least partly) spurious. These difficulties however do not arise in the case of the oil industry sample. A preliminary analysis indicates that there is here no significant relation between leverage and pay-out ratios and also no significant correlation (either gross or partial) between yields and pay-out ratios.

[45] The analysis developed in this paper is essentially a comparative-statics, not a dynamic analysis. This note of caution applies with special force to Proposition III. Such problems as those posed by expected changes in r and in ρ_k over time will not be treated here. Although they are in principle amenable to analysis within the general framework we have laid out, such an undertaking is sufficiently complex to deserve separate treatment. *Cf.* note 17.

[46] The extension of the proof to other types of financing, such as the sale of preferred stock or the issuance of stock rights is straightforward.

[47] Since no confusion is likely to arise, we have again, for simplicity, eliminated the subscripts identifying the firm in the equations to follow. Except for ρ_k, the subscripts now refer to time periods.

and that the value of the common stock was:

$$S_0 = V_0 - D_0. \tag{21}$$

If now the firm borrows I dollars to finance an investment yielding ρ^* its market value will become:

$$V_1 = \frac{\overline{X}_0 + \rho^* I}{\rho_k} = V_0 + \frac{\rho^* I}{\rho_k} \tag{22}$$

and the value of its common stock will be:

$$S_1 = V_1 - (D_0 + I) = V_0 + \frac{\rho^* I}{\rho_k} - D_0 - I \tag{23}$$

or using equation 21,

$$S_1 = S_0 + \frac{\rho^* I}{\rho_k} - I. \tag{24}$$

Hence $S_1 \gtreqless S_0$ as $\rho^* \gtreqless \rho_k$.[48]

To illustrate, suppose the capitalization rate for uncertain streams in the kth class is 10 per cent and the rate of interest is 4 per cent. Then if a given company had an expected income of 1,000 and if it were financed entirely by common stock we know from Proposition I that the market value of its stock would be 10,000. Assume now that the managers of the firm discover an investment opportunity which will require an outlay of 100 and which is expected to yield 8 per cent. At first sight this might appear to be a profitable opportunity since the expected return is double the interest cost. If, however, the management borrows the necessary 100 at 4 per cent, the total expected income of the company rises to 1,008 and the market value of the firm to 10,080. But the firm now will have 100 of bonds in its capital structure so that, paradoxically, the market value of the stock must actually be reduced from 10,000 to 9,980 as a consequence of this apparently profitable investment. Or, to put it another way, the gains from being able to tap cheap, borrowed funds are more than offset for the stockholders by the market's discounting of the stock for the added leverage assumed.

Consider next the case of retained earnings. Suppose that in the course of its operations the firm acquired I dollars of cash (without impairing

[48] In the case of bond-financing the rate of interest on bonds does not enter explicitly into the decision (assuming the firm borrows at the market rate of interest). This is true, moreover, given the conditions outlined in Section I.C, even though interest rates may be an increasing function of debt outstanding. To the extent that the firm borrowed at a rate other than the market rate the two I's in equation (24) would no longer be identical and an additional gain or loss, as the case might be, would accrue to the shareholders. It might also be noted in passing that permitting the two I's in (24) to take on different values provides a simple method for introducing underwriting expenses into the analysis.

the earning power of its assets). If the cash is distributed as a dividend to the stockholders their wealth W_0, after the distribution will be:

$$W_0 = S_0 + I = \frac{\overline{X}_0}{\rho_k} - D_0 + I \tag{25}$$

where $\overline{X}_0$ represents the expected return from the assets exclusive of the amount I in question. If however the funds are retained by the company and used to finance new assets whose expected rate of return is ρ^*, then the stockholders' wealth would become:

$$W_1 = S_1 = \frac{\overline{X}_0 + \rho^* I}{\rho_k} - D_0 = S_0 + \frac{\rho^* I}{\rho_k} \cdot \tag{26}$$

Clearly $W_1 \gtreqless W_0$ as $\rho^* \gtreqless \rho_k$ so that an investment financed by retained earnings raises the net worth of the owners if and only if $\rho^* > \rho_k$.[49]

Consider finally, the case of common-stock financing. Let P_0 denote the current market price per share of stock and assume, for simplicity, that this price reflects currently expected earnings only, that is, it does not reflect any future increase in earnings as a result of the investment under consideration.[50] Then if N is the original number of shares, the price per share is:

$$P_0 = S_0/N \tag{27}$$

and the number of new shares, M, needed to finance an investment of I dollars is given by:

$$M = \frac{I}{P_0} \cdot \tag{28}$$

As a result of the investment the market value of the stock becomes:

$$S_1 = \frac{\overline{X}_0 + \rho^* I}{\rho_k} - D_0 = S_0 + \frac{\rho^* I}{\rho_k} = NP_0 + \frac{\rho^* I}{\rho_k}$$

and the price per share:

$$P_1 = \frac{S_1}{N + M} = \frac{1}{N + M}\left[NP_0 + \frac{\rho^* I}{\rho_k}\right]. \tag{29}$$

[49] The conclusion that ρ_k is the cut-off point for investments financed from internal funds applies not only to undistributed net profits, but to depreciation allowances (and even to the funds represented by the current sale value of any asset or collection of assets). Since the owners can earn ρ_k by investing funds elsewhere in the class, partial or total liquidating distributions should be made whenever the firm cannot achieve a marginal internal rate of return equal to ρ_k.

[50] If we assumed that the market price of the stock did reflect the expected higher future earnings (as would be the case if our original set of assumptions above were strictly followed) the analysis would differ slightly in detail, but not in essentials. The cut-off point for new investment would still be ρ_k, but where $\rho^* > \rho_k$ the gain to the original owners would be larger than if the stock price were based on the pre-investment expectations only.

Since by equation (28), $I = MP_0$, we can add MP_0 and subtract I from the quantity in bracket, obtaining:

$$
(30) \qquad \begin{aligned} P_1 &= \frac{1}{N+M}\left[(N+M)P_0 + \frac{\rho^* - \rho_k}{\rho_k} I\right] \\ &= P_0 + \frac{1}{N+M}\,\frac{\rho^* - \rho_k}{\rho_k} I > P_0 \text{ if,} \end{aligned}
$$

and only if, $\rho^* > \rho_k$.

Thus an investment financed by common stock is advantageous to the current stockholders if and only if its yield exceeds the capitalization rate ρ_k.

Once again a numerical example may help to illustrate the result and make it clear why the relevant cut-off rate is ρ_k and not the current yield on common stock, i. Suppose that ρ_k is 10 per cent, r is 4 per cent, that the original expected income of our company is 1,000 and that management has the opportunity of investing 100 having an expected yield of 12 per cent. If the original capital structure is 50 per cent debt and 50 per cent equity, and 1,000 shares of stock are initially outstanding, then, by Proposition I, the market value of the common stock must be 5,000 or 5 per share. Furthermore, since the interest bill is $.04 \times 5{,}000 = 200$, the yield on common stock is $800/5{,}000 = 16$ per cent. It may then appear that financing the additional investment of 100 by issuing 20 shares to outsiders at 5 per share would dilute the equity of the original owners since the 100 promises to yield 12 per cent whereas the common stock is currently yielding 16 per cent. Actually, however, the income of the company would rise to 1,012; the value of the firm to 10,120; and the value of the common stock to 5,120. Since there are now 1,020 shares, each would be worth 5.02 and the wealth of the original stockholders would thus have been increased. What has happened is that the dilution in expected earnings per share (from .80 to .796) has been more than offset, in its effect upon the market price of the shares, by the decrease in leverage.

Our conclusion is, once again, at variance with conventional views,[51] so much so as to be easily misinterpreted. Read hastily, Proposition III seems to imply that the capital structure of a firm is a matter of indifference; and that, consequently, one of the core problems of corporate finance—the problem of the optimal capital structure for a firm—is no problem at all. It may be helpful, therefore, to clear up such possible misundertandings.

[51] In the matter of investment policy under uncertainty there is no single position which represents "accepted" doctrine. For a sample of current formulations, all very different from ours, see Joel Dean [2, esp. Ch. 3], M. Gordon and E. Shapiro [5], and Harry Roberts [17].

B. *Proposition III and Financial Planning by Firms*

Misinterpretation of the scope of Proposition III can be avoided by remembering that this Proposition tells us only that the type of instrument used to finance an investment is irrelevant to the question of whether or not the investment is worth while. This does not mean that the owners (or the managers) have no grounds whatever for preferring one financing plan to another; or that there are no other policy or technical issues in finance at the level of the firm.

That grounds for preferring one type of financial structure to another will still exist within the framework of our model can readily be seen for the case of common-stock financing. In general, except for something like a widely publicized oil-strike, we would expect the market to place very heavy weight on current and recent past earnings in forming expectations as to future returns. Hence, if the owners of a firm discovered a major investment opportunity which they felt would yield much more than ρ_k, they might well prefer not to finance it via common stock at the then ruling price, because this price may fail to capitalize the new venture. A better course would be a pre-emptive issue of stock (and in this connection it should be remembered that stockholders are free to borrow and buy). Another possibility would be to finance the project initially with debt. Once the project had reflected itself in increased actual earnings, the debt could be retired either with an equity issue at much better prices or through retained earnings. Still another possibility along the same lines might be to combine the two steps by means of a convertible debenture or preferred stock, perhaps with a progressively declining conversion rate. Even such a double-stage financing plan may possibly be regarded as yielding too large a share to outsiders since the new stockholders are, in effect, being given an interest in any similar opportunities the firm may discover in the future. If there is a reasonable prospect that even larger opportunities may arise in the near future and if there is some danger that borrowing now would preclude more borrowing later, the owners might find their interests best protected by splitting off the current opportunity into a separate subsidiary with independent financing. Clearly the problems involved in making the crucial estimates and in planning the optimal financial strategy are by no means trivial, even though they should have no bearing on the basic decision to invest (as long as $\rho^* \geqq \rho_k$).[52]

Another reason why the alternatives in financial plans may not be a matter of indifference arises from the fact that managers are concerned

[52] Nor can we rule out the possibility that the existing owners, if unable to use a financing plan which protects their interest, may actually prefer to pass up an otherwise profitable venture rather than give outsiders an "excessive" share of the business. It is presumably in situations of this kind that we could justifiably speak of a shortage of "equity capital," though this kind of market imperfection is likely to be of significance only for small or new firms.

with more than simply furthering the interest of the owners. Such other objectives of the management—which need not be necessarily in conflict with those of the owners—are much more likely to be served by some types of financing arrangements than others. In many forms of borrowing agreements, for example, creditors are able to stipulate terms which the current management may regard as infringing on its prerogatives or restricting its freedom to maneuver. The creditors might even be able to insist on having a direct voice in the formation of policy.[53] To the extent, therefore, that financial policies have these implications for the management of the firm, something like the utility approach described in the introductory section becomes relevant to financial (as opposed to investment) decision-making. It is, however, the utility functions of the managers per se and not of the owners that are now involved.[54]

In summary, many of the specific considerations which bulk so large in traditional discussions of corporate finance can readily be superimposed on our simple framework without forcing any drastic (and certainly no systematic) alteration of the conclusion which is our principal concern, namely that for investment decisions, the marginal cost of capital is ρ_k.

C. *The Effect of the Corporate Income Tax on Investment Decisions*

In Section I it was shown that when an unintegrated corporate income tax is introduced, the original version of our Proposition I,

$$\overline{X}/V = \rho_k = \text{a constant}$$

must be rewritten as:

$$\frac{(\overline{X} - rD)(1 - \tau) + rD}{V} \equiv \frac{\overline{X}^\tau}{V} = \rho_k{}^\tau = \text{a constant.} \tag{11}$$

Throughout Section I we found it convenient to refer to $\overline{X}^\tau/V$ as the cost of capital. The appropriate measure of the cost of capital relevant

[53] Similar considerations are involved in the matter of dividend policy. Even though the stockholders may be indifferent as to payout policy as long as investment policy is optimal, the management need not be so. Retained earnings involve far fewer threats to control than any of the alternative sources of funds and, of course, involve no underwriting expense or risk. But against these advantages management must balance the fact that sharp changes in dividend rates, which heavy reliance on retained earnings might imply, may give the impression that a firm's finances are being poorly managed, with consequent threats to the control and professional standing of the management.

[54] In principle, at least, this introduction of management's risk preferences with respect to financing methods would do much to reconcile the apparent conflict between Proposition III and such empirical findings as those of Modigliani and Zeman [14] on the close relation between interest rates and the ratio of new debt to new equity issues; or of John Lintner [12] on the considerable stability in target and actual dividend-payout ratios.

to investment decisions, however, is the ratio of the expected return *before* taxes to the market value, *i.e.*, $\overline{X}/V$. From (11) above we find:

$$\frac{\overline{X}}{V} = \frac{\rho_k^\tau - \tau_r(D/V)}{1-\tau} = \frac{\rho_k^\tau}{1-\tau}\left[1 - \frac{\tau r D}{\rho_k^\tau V}\right], \tag{31}$$

which shows that the cost of capital now depends on the debt ratio, decreasing, as D/V rises, at the constant rate $\tau r/(1-\tau)$.[55] Thus, with a corporate income tax under which interest is a deductible expense, gains can accrue to stockholders from having debt in the capital structure, even when capital markets are perfect. The gains however are small, as can be seen from (31), and as will be shown more explicitly below.

From (31) we can develop the tax-adjusted counterpart of Proposition III by interpreting the term D/V in that equation as the proportion of debt used in any additional financing of V dollars. For example, in the case where the financing is entirely by new common stock, $D=0$ and the required rate of return ρ_k^S on a venture so financed becomes:

$$\rho_k^S = \frac{\rho_k^\tau}{1-\tau}. \tag{32}$$

For the other extreme of pure debt financing $D=V$ and the required rate of return, ρ_k^D, becomes:

$$\rho_k^D = \frac{\rho_k^\tau}{1-\tau}\left[1 - \tau\frac{r}{\rho_k^\tau}\right] = \rho_k^S\left[1 - \tau\frac{r}{\rho_k^\tau}\right] = \rho_k^S - \frac{\tau}{1-\tau}r.^{56} \tag{33}$$

For investments financed out of retained earnings, the problem of defining the required rate of return is more difficult since it involves a comparison of the tax consequences to the individual stockholder of receiving a dividend versus having a capital gain. Depending on the time of realization, a capital gain produced by retained earnings may be taxed either at ordinary income tax rates, 50 per cent of these rates, 25 per

[55] Equation (31) is amenable, in principle, to statistical tests similar to those described in Section I.E. However we have not made any systematic attempt to carry out such tests so far, because neither the Allen nor the Smith study provides the required information. Actually, Smith's data included a very crude estimate of tax liability, and, using this estimate, we did in fact obtain a negative relation between $\overline{X}/V$ and D/V. However, the correlation $(-.28)$ turned out to be significant only at about the 10 per cent level. While this result is not conclusive, it should be remembered that, according to our theory, the slope of the regression equation should be in any event quite small. In fact, with a value of τ in the order of .5, and values of ρ_k^τ and r in the order of 8.5 and 3.5 per cent respectively (*cf.* Section I.E) an increase in D/V from 0 to 60 per cent (which is, approximately, the range of variation of this variable in the sample) should tend to reduce the average cost of capital only from about 17 to about 15 per cent.

[56] This conclusion does not extend to preferred stocks even though they have been classed with debt issues previously. Since preferred dividends except for a portion of those of public utilities are not in general deductible from the corporate tax, the cut-off point for new financing via preferred stock is exactly the same as that for common stock.

cent, or zero, if held till death. The rate on any dividends received in the event of a distribution will also be a variable depending on the amount of other income received by the stockholder, and with the added complications introduced by the current dividend-credit provisions. If we assume that the managers proceed on the basis of reasonable estimates as to the average values of the relevant tax rates for the owners, then the required return for retained earnings ρ_k^R can be shown to be:

$$\rho_k^R = \rho_k^\tau \frac{1}{1-\tau} \frac{1-\tau_d}{1-\tau_g} = \frac{1-\tau_d}{1-\tau_g} \rho_k^s \tag{34}$$

where τ_d is the assumed rate of personal income tax on dividends and τ_g is the assumed rate of tax on capital gains.

A numerical illustration may perhaps be helpful in clarifying the relationship between these required rates of return. If we take the following round numbers as representative order-of-magnitude values under present conditions: an after-tax capitalization rate ρ_k^τ of 10 per cent, a rate of interest on bonds of 4 per cent, a corporate tax rate of 50 per cent, a marginal personal income tax rate on dividends of 40 per cent (corresponding to an income of about $25,000 on a joint return), and a capital gains rate of 20 per cent (one-half the marginal rate on dividends), then the required rates of return would be: (1) 20 per cent for investments financed entirely by issuance of new common shares; (2) 16 per cent for investments financed entirely by new debt; and (3) 15 per cent for investments financed wholly from internal funds.

These results would seem to have considerable significance for current discussions of the effect of the corporate income tax on financial policy and on investment. Although we cannot explore the implications of the results in any detail here, we should at least like to call attention to the remarkably small difference between the "cost" of equity funds and debt funds. With the numerical values assumed, equity money turned out to be only 25 per cent more expensive than debt money, rather than something on the order of 5 times as expensive as is commonly supposed to be the case.[57] The reason for the wide difference is that the traditional

[57] See *e.g.*, D. T. Smith [18]. It should also be pointed out that our tax system acts in other ways to reduce the gains from debt financing. Heavy reliance on debt in the capital structure, for example, commits a company to paying out a substantial proportion of its income in the form of interest payments taxable to the owners under the personal income tax. A debt-free company, by contrast, can reinvest in the business all of its (smaller) net income and to this extent subject the owners only to the low capital gains rate (or possibly no tax at all by virtue of the loophole at death). Thus, we should expect a high degree of leverage to be of value to the owners, even in the case of closely held corporations, primarily in cases where their firm was not expected to have much need for additional funds to expand assets and earnings in the future. To the extent that opportunities for growth were available, as they presumably would be for most successful corporations, the interest of the stockholders would tend to be better served by a structure which permitted maximum use of retained earnings.

view starts from the position that debt funds are several times cheaper than equity funds even in the absence of taxes, with taxes serving simply to magnify the cost ratio in proportion to the corporate rate. By contrast, in our model in which the repercussions of debt financing on the value of shares are taken into account, the *only* difference in cost is that due to the tax effect, and its magnitude is simply the tax on the "grossed up" interest payment. Not only is this magnitude likely to be small but our analysis yields the further paradoxical implication that the stockholders' gain from, and hence incentive to use, debt financing is actually smaller the lower the rate of interest. In the extreme case where the firm could borrow for practically nothing, the advantage of debt financing would also be practically nothing.

III. *Conclusion*

With the development of Proposition III the main objectives we outlined in our introductory discussion have been reached. We have in our Propositions I and II at least the foundations of a theory of the valuation of firms and shares in a world of uncertainty. We have shown, moreover, how this theory can lead to an operational definition of the cost of capital and how that concept can be used in turn as a basis for rational investment decision-making within the firm. Needless to say, however, much remains to be done before the cost of capital can be put away on the shelf among the solved problems. Our approach has been that of static, partial equilibrium analysis. It has assumed among other things a state of atomistic competition in the capital markets and an ease of access to those markets which only a relatively small (though important) group of firms even come close to possessing. These and other drastic simplifications have been necessary in order to come to grips with the problem at all. Having served their purpose they can now be relaxed in the direction of greater realism and relevance, a task in which we hope others interested in this area will wish to share.

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Corporate Income Taxes and the Cost of Capital: A Correction

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equanimity a writing-down of the value of their reserves, or unless one is prepared to forego the possibility of exchange-rate adjustment, any major extension of the gold exchange standard is dependent upon the introduction of guarantees. It is misleading to suggest that the multiple key-currency system is an alternative to a guarantee, as implied by Roosa [6, pp. 5-7 and 9-12].

IV. *Conclusion*

The most noteworthy conclusion to be drawn from this analysis is that the successful operation of a multiple key-currency system would require both exchange guarantees and continuing cooperation between central bankers of a type that would effectively limit their choice as to the form in which they hold their reserves. Yet these are two of the conditions whose undesirability has frequently been held to be an obstacle to implementation of the alternative proposal to create a world central bank. The multiple key-currency proposal represents an attempt to avoid the impracticality supposedly associated with a world central bank, but if both proposals in fact depend on the fulfillment of similar conditions, it is difficult to convince oneself that the sacrifice of the additional liquidity that an almost closed system would permit is worth while. Unless, of course, the object of the exercise is to reinforce discipline rather than to expand liquidity.

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Corporate Income Taxes and the Cost of Capital: A Correction

The purpose of this communication is to correct an error in our paper "The Cost of Capital, Corporation Finance and the Theory of Investment" (this *Review*, June 1958). In our discussion of the effects of the present method of taxing corporations on the valuation of firms, we said (p. 272):

> The deduction of interest in computing taxable corporate profits will prevent the arbitrage process from making the value of all firms in a given class proportional to the expected returns generated by their

physical assets. Instead, it can be shown (by the same type of proof used for the original version of Proposition I) that *the market values of firms in each class must be proportional in equilibrium to their expected returns net of taxes* (*that is, to the sum of the interest paid and expected net stockholder income*). (Italics added.)

The statement in italics, unfortunately, is wrong. For even though one firm may have an *expected* return after taxes (our $\overline{X}^\tau$) twice that of another firm in the same risk-equivalent class, it will not be the case that the *actual* return after taxes (our X^τ) of the first firm will always be twice that of the second, if the two firms have different degrees of leverage.[1] And since the distribution of returns after taxes of the two firms will not be proportional, there can be no "arbitrage" process which forces their values to be proportional to their expected after-tax returns.[2] In fact, it can be shown—and this time it really will be shown—that "arbitrage" will make values within any class a function not only of expected after-tax returns, but of the tax rate and the degree of leverage. This means, among other things, that the tax advantages of debt financing are somewhat greater than we originally suggested and, to this extent, the quantitative difference between the valuations implied by our position and by the traditional view is narrowed. It still remains true, however, that under our analysis the tax advantages of debt are the *only* permanent advantages so that the gulf between the two views in matters of interpretation and policy is as wide as ever.

I. *Taxes, Leverage, and the Probability Distribution of After-Tax Returns*

To see how the distribution of after-tax earnings is affected by leverage, let us again denote by the random variable X the (long-run average) earnings before interest and taxes generated by the currently owned assets of a given firm in some stated risk class, k.[3] From our definition of a risk class it follows that X can be expressed in the form $\overline{X}Z$, where $\overline{X}$ is the expected value of X, and the random variable $Z = X/\overline{X}$, having the same value for all firms in class k, is a drawing from a distribution, say $f_k(Z)$. Hence the

[1] With some exceptions, which will be noted when they occur, we shall preserve here both the notation and the terminology of the original paper. A working knowledge of both on the part of the reader will be presumed.

[2] Barring, of course, the trivial case of universal linear utility functions. Note that in deference to Professor Durand (see his Comment on our paper and our reply, this *Review*, Sept. 1959, *49*, 639–69) we here and throughout use quotation marks when referring to arbitrage.

[3] Thus our X corresponds essentially to the familiar EBIT concept of the finance literature. The use of EBIT and related "income" concepts as the basis of valuation is strictly valid only when the underlying real assets are assumed to have perpetual lives. In such a case, of course, EBIT and "cash flow" are one and the same. This was, in effect, the interpretation of X we used in the original paper and we shall retain it here both to preserve continuity and for the considerable simplification it permits in the exposition. We should point out, however, that the perpetuity interpretation is much less restrictive than might appear at first glance. Before-tax cash flow and EBIT can also safely be equated even where assets have finite lives as soon as these assets attain a steady state age distribution in which annual replacements equal annual depreciation. The subject of finite lives of assets will be further discussed in connection with the problem of the cut-off rate for investment decisions.

random variable X^τ, measuring the after-tax return, can be expressed as:

$$(1)\quad X^\tau = (1-\tau)(X-R) + R = (1-\tau)X + \tau R = (1-\tau)\overline{X}Z + \tau R$$

where τ is the marginal corporate income tax rate (assumed equal to the average), and R is the interest bill. Since $E(X^\tau) \equiv \overline{X}^\tau = (1-\tau)\overline{X} + \tau R$ we can substitute $\overline{X}^\tau - \tau R$ for $(1-\tau)\overline{X}$ in (1) to obtain:

$$(2)\qquad X^\tau = (\overline{X}^\tau - \tau R)Z + \tau R = \overline{X}^\tau\left(1 - \frac{\tau R}{\overline{X}^\tau}\right)Z + \tau R.$$

Thus, if the tax rate is other than zero, the shape of the distribution of X^τ will depend not only on the "scale" of the stream $\overline{X}^\tau$ and on the distribution of Z, but also on the tax rate and the degree of leverage (one measure of which is $R/\overline{X}^\tau$). For example, if Var $(Z) = \sigma^2$, we have:

$$\text{Var}\,(X^\tau) = \sigma^2(\overline{X}^\tau)^2\left(1 - \tau\frac{R}{\overline{X}^\tau}\right)^2$$

implying that for given $\overline{X}^\tau$ the variance of after-tax returns is smaller, the higher τ and the degree of leverage.[4]

II. *The Valuation of After-Tax Returns*

Note from equation (1) that, from the investor's point of view, the long-run average stream of after-tax returns appears as a sum of two components: (1) an uncertain stream $(1-\tau)\overline{X}Z$; and (2) a sure stream τR.[5] This suggests that the equilibrium market value of the combined stream can be found by capitalizing each component separately. More precisely, let ρ^τ be the rate at which the market capitalizes the expected returns net of tax of an unlevered company of size $\overline{X}$ in class k, i.e.,

$$\rho^\tau = \frac{(1-\tau)\overline{X}}{V_U} \quad \text{or} \quad V_U = \frac{(1-\tau)\overline{X}}{\rho^\tau};^{6}$$

[4] It may seem paradoxical at first to say that leverage *reduces* the variability of outcomes, but remember we are here discussing the variability of total returns, interest plus net profits. The variability of stockholder net profits will, of course, be greater in the presence than in the absence of leverage, though relatively less so than in an otherwise comparable world of no taxes. The reasons for this will become clearer after the discussion in the next section.

[5] The statement that τR—the tax saving per period on the interest payments—is a sure stream is subject to two qualifications. First, it must be the case that firms can always obtain the tax benefit of their interest deductions either by offsetting them directly against other taxable income in the year incurred; or, in the event no such income is available in any given year, by carrying them backward or forward against past or future taxable earnings; or, in the extreme case, by merger of the firm with (or its sale to) another firm that can utilize the deduction. Second, it must be assumed that the tax rate will remain the same. To the extent that neither of these conditions holds exactly then some uncertainty attaches even to the tax savings, though, of course, it is of a different kind and order from that attaching to the stream generated by the assets. For simplicity, however, we shall here ignore these possible elements of delay or of uncertainty in the tax saving; but it should be kept in mind that this neglect means that the subsequent valuation formulas overstate, if anything, the value of the tax saving for any given permanent level of debt.

[6] Note that here, as in our original paper, we neglect dividend policy and "growth" in the

and let r be the rate at which the market capitalizes the sure streams generated by debts. For simplicity, assume this rate of interest is a constant independent of the size of the debt so that

$$r = \frac{R}{D} \quad \text{or} \quad D = \frac{R}{r}.$$[7]

Then we would expect the value of a levered firm of size $\bar{X}$, with a permanent level of debt D_L in its capital structure, to be given by:

$$V_L = \frac{(1-\tau)\bar{X}}{\rho\tau} + \frac{\tau R}{r} = V_U + \tau D_L.^{8} \tag{3}$$

In our original paper we asserted instead that, within a risk class, market value would be proportional to expected after-tax return $\bar{X}^\tau$ (cf. our original equation [11]), which would imply:

$$V_L = \frac{\bar{X}^\tau}{\rho^\tau} = \frac{(1-\tau)\bar{X}}{\rho^\tau} + \frac{\tau R}{\rho^\tau} = V_U + \frac{r}{\rho^\tau}\tau D_L. \tag{4}$$

We will now show that if (3) does not hold, investors can secure a more efficient portfolio by switching from relatively overvalued to relatively undervalued firms. Suppose first that unlevered firms are overvalued or that

$$V_L - \tau D_L < V_U.$$

An investor holding m dollars of stock in the unlevered company has a right to the fraction m/V_U of the eventual outcome, i.e., has the uncertain income

$$Y_U = \left(\frac{m}{V_U}\right)(1-\tau)\bar{X}Z.$$

Consider now an alternative portfolio obtained by investing m dollars as follows: (1) the portion,

$$m\left(\frac{S_L}{S_L + (1-\tau)D_L}\right),$$

is invested in the stock of the levered firm, S_L; and (2) the remaining portion,

$$m\left(\frac{(1-\tau)D_L}{S_L + (1-\tau)D_L}\right),$$

sense of opportunities to invest at a rate of return greater than the market rate of return. These subjects are treated extensively in our paper, "Dividend Policy, Growth and the Valuation of Shares," *Jour. Bus.*, Univ. Chicago, Oct. 1961, 411–33.

[7] Here and throughout, the corresponding formulas when the rate of interest rises with leverage can be obtained merely by substituting $r(L)$ for r, where L is some suitable measure of leverage.

[8] The assumption that the debt is permanent is not necessary for the analysis. It is employed here both to maintain continuity with the original model and because it gives an upper bound on the value of the tax saving. See in this connection footnote 5 and footnote 9.

is invested in its bonds. The stock component entitles the holder to a fraction,

$$\frac{m}{S_L + (1-\tau)D_L},$$

of the net profits of the levered company or

$$\left(\frac{m}{S_L + (1-\tau)D_L}\right)[(1-\tau)(\overline{X}Z - R_L)].$$

The holding of bonds yields

$$\left(\frac{m}{S_L + (1-\tau)D_L}\right)[(1-\tau)R_L].$$

Hence the total outcome is

$$Y_L = \left(\frac{m}{(S_L + (1-\tau)D_L)}\right)[(1-\tau)\overline{X}Z]$$

and this will dominate the uncertain income Y_U if (and only if)

$$S_L + (1-\tau)D_L \equiv S_L + D_L - \tau D_L \equiv V_L - \tau D_L < V_U.$$

Thus, in equilibrium, V_U cannot exceed $V_L - \tau D_L$, for if it did investors would have an incentive to sell shares in the unlevered company and purchase the shares (and bonds) of the levered company.

Suppose now that $V_L - \tau D_L > V_U$. An investment of m dollars in the stock of the levered firm entitles the holder to the outcome

$$\begin{aligned} Y_L &= (m/S_L)[(1-\tau)(\overline{X}Z - R_L)] \\ &= (m/S_L)(1-\tau)\overline{X}Z - (m/S_L)(1-\tau)R_L. \end{aligned}$$

Consider the following alternative portfolio: (1) borrow an amount $(m/S_L)(1-\tau)D_L$ for which the interest cost will be $(m/S_L)(1-\tau)R_L$ (assuming, of course, that individuals and corporations can borrow at the same rate, r); and (2) invest m plus the amount borrowed, i.e.,

$$m + \frac{m(1-\tau)D_L}{S_L} = m\frac{S_L + (1-\tau)D_L}{S_L} = (m/S_L)[V_L - \tau D_L]$$

in the stock of the unlevered firm. The outcome so secured will be

$$(m/S_L)\left(\frac{V_L - \tau D_L}{V_U}\right)(1-\tau)\overline{X}Z.$$

Subtracting the interest charges on the borrowed funds leaves an income of

$$Y_U = (m/S_L)\left(\frac{V_L - \tau D_L}{V_U}\right)(1-\tau)\overline{X}Z - (m/S_L)(1-\tau)R_L$$

which will dominate Y_L if (and only if) $V_L - \tau D_L > V_U$. Thus, in equilibrium, both $V_L - \tau\, D_L > V_U$ and $V_L - \tau\, D_L < V_U$ are ruled out and (3) must hold.

KY PSC Case No. 2016-00162, Attachment B to AG 1-25
Page 45 of 50

III. *Some Implications of Formula* (3)

To see what is involved in replacing (4) with (3) as the rule of valuation, note first that both expressions make the value of the firm a function of leverage and the tax rate. The difference between them is a matter of the size and source of the tax advantages of debt financing. Under our original formulation, values within a class were strictly proportional to expected earnings after taxes. Hence the tax advantage of debt was due solely to the fact that the deductibility of interest payments implied a higher level of after-tax income for any given level of before-tax earnings (i.e., higher by the amount τR since $\overline{X}^\tau = (1-\tau)\overline{X} + \tau R$). Under the corrected rule (3), however, there is an additional gain due to the fact that the extra after-tax earnings, τR, represent a sure income in contrast to the uncertain outcome $(1-\tau)\overline{X}$. Hence τR is capitalized at the more favorable certainty rate, $1/r$, rather than at the rate for uncertain streams, $1/\rho^\tau$.[9]

Since the difference between (3) and (4) is solely a matter of the rate at which the tax savings on interest payments are capitalized, the required changes in all formulas and expressions derived from (4) are reasonably straightforward. Consider, first, the before-tax earnings yield, i.e., the ratio of expected earnings before interest and taxes to the value of the firm.[10] Dividing both sides of (3) by V and by $(1-\tau)$ and simplifying we obtain:

$$\frac{\overline{X}}{V} = \frac{\rho^\tau}{1-\tau}\left[1 - \tau\frac{D}{V}\right] \tag{31.c}$$

which replaces our original equation (31) (p. 294). The new relation differs from the old in that the coefficient of D/V in the original (31) was smaller by a factor of r/ρ^τ.

Consider next the after-tax earnings yield, i.e., the ratio of interest payments plus profits after taxes to total market value.[11] This concept was discussed extensively in our paper because it helps to bring out more clearly the differences between our position and the traditional view, and because it facilitates the construction of empirical tests of the two hypotheses about the valuation process. To see what the new equation (3) implies for this yield we need merely substitute $\overline{X}^\tau - \tau R$ for $(1-\tau)\overline{X}$ in (3) obtaining:

[9] Remember, however, that in one sense formula (3) gives only an upper bound on the value of the firm since $\tau R/r = \tau D$ is an exact measure of the value of the tax saving only where both the tax rate and the level of debt are assumed to be fixed forever (and where the firm is certain to be able to use its interest deduction to reduce taxable income either directly or via transfer of the loss to another firm). Alternative versions of (3) can readily be developed for cases in which the debt is not assumed to be permanent, but rather to be outstanding only for some specified finite length of time. For reasons of space, we shall not pursue this line of inquiry here beyond observing that the shorter the debt period considered, the closer does the valuation formula approach our original (4). Hence, the latter is perhaps still of some interest if only as a lower bound.

[10] Following usage common in the field of finance we referred to this yield as the "average cost of capital." We feel now, however, that the term "before-tax earnings yield" would be preferable both because it is more immediately descriptive and because it releases the term "cost of capital" for use in discussions of optimal investment policy (in accord with standard usage in the capital budgeting literature).

[11] We referred to this yield as the "after-tax cost of capital." Cf. the previous footnote.

$$V = \frac{\overline{X}^\tau - \tau R}{\rho^\tau} + \tau D = \frac{\overline{X}^\tau}{\rho^\tau} + \tau \frac{\rho^\tau - r}{\rho^\tau} D, \tag{5}$$

from which it follows that the after-tax earnings yield must be:

$$\frac{\overline{X}^\tau}{V} = \rho^\tau - \tau(\rho^\tau - r)D/V. \tag{11.c}$$

This replaces our original equation (11) (p. 272) in which we had simply $\overline{X}^\tau/V=\rho^\tau$. Thus, in contrast to our earlier result, the corrected version (11.c) implies that even the after-tax yield is affected by leverage. The predicted rate of decrease of $\overline{X}^\tau/V$ with D/V, however, is still considerably smaller than under the naive traditional view, which, as we showed, implied essentially $\overline{X}^\tau/V=\rho^\tau\text{-}(\rho^\tau-r)D/V$. See our equation (17) and the discussion immediately preceding it (p. 277).[12] And, of course, (11.c) implies that the effect of leverage on $\overline{X}^\tau/V$ is *solely* a matter of the deductibility of interest payments whereas, under the traditional view, going into debt would lower the cost of capital regardless of the method of taxing corporate earnings.

Finally, we have the matter of the after-tax yield on *equity* capital, i.e., the ratio of net profits after taxes to the value of the shares.[13] By subtracting D from both sides of (5) and breaking $\overline{X}^\tau$ into its two components—expected net profits after taxes, $\bar{\pi}^\tau$, and interest payments, $R=rD$—we obtain after simplifying:

$$S = V - D = \frac{\bar{\pi}^\tau}{\rho^\tau} - (1 - \tau)\left(\frac{\rho^\tau - r}{\rho^\tau}\right)D. \tag{6}$$

From (6) it follows that the after-tax yield on equity capital must be:

$$\frac{\bar{\pi}^\tau}{S} = \rho^\tau + (1 - \tau)[\rho^\tau - r]D/S \tag{12.c}$$

which replaces our original equation (12), $\bar{\pi}^\tau/S=\rho^\tau+(\rho^\tau-r)D/S$ (p. 272). The new (12.c) implies an increase in the after-tax yield on equity capital as leverage increases which is smaller than that of our original (12) by a factor of $(1-\tau)$. But again, the linear increasing relation of the corrected (12.c) is still fundamentally different from the naive traditional view which asserts the cost of equity capital to be completely independent of leverage (at least as long as leverage remains within "conventional" industry limits).

IV. *Taxes and the Cost of Capital*

From these corrected valuation formulas we can readily derive corrected measures of the cost of capital in the capital budgeting sense of the minimum prospective yield an investment project must offer to be just worth

[12] The i_k^* of (17) is the same as ρ^τ in the present context, each measuring the ratio of net profits to the value of the shares (and hence of the whole firm) in an unlevered company of the class.

[13] We referred to this yield as the "after-tax cost of equity capital." Cf. footnote 9.

undertaking from the standpoint of the present stockholders. If we interpret earnings streams as perpetuities, as we did in the original paper, then we actually have two equally good ways of defining this minimum yield: either by the required increase in before-tax earnings, $d\bar{X}$, or by the required increase in earnings net of taxes, $d\bar{X}(1-\tau)$.[14] To conserve space, however, as well as to maintain continuity with the original paper, we shall concentrate here on the before-tax case with only brief footnote references to the net-of-tax concept.

Analytically, the derivation of the cost of capital in the above sense amounts to finding the minimum value of $d\bar{X}/dI$ for which $dV=dI$, where I denotes the level of new investment.[15] By differentiating (3) we see that:

$$\text{(7)} \qquad \frac{dV}{dI} = \frac{1-\tau}{\rho^\tau}\frac{d\bar{X}}{dI} + \tau\frac{dD}{dI} \geq 1 \qquad \text{if } \frac{d\bar{X}}{dI} \geq \frac{1-\tau\dfrac{dD}{dI}}{1-\tau}\rho^\tau.$$

Hence the before tax required rate of return cannot be defined without reference to financial policy. In particular, for an investment considered as being financed entirely by new equity capital $dD/dI=0$ and the required rate of return or marginal cost of equity financing (neglecting flotation costs) would be:

$$\rho^S = \frac{\rho^\tau}{1-\tau}.$$

This result is the same as that in the original paper (see equation [32], p. 294) and is applicable to any other sources of financing where the remuneration to the suppliers of capital is not deductible for tax purposes. It applies, therefore, to preferred stock (except for certain partially deductible issues of public utilities) and would apply also to retained earnings were it not for the favorable tax treatment of capital gains under the personal income tax.

For investments considered as being financed entirely by new debt capital $dI=dD$ and we find from (7) that:

$$\text{(33.c)} \qquad \rho^D = \rho^\tau$$

which replaces our original equation (33) in which we had:

$$\text{(33)} \qquad \rho^D = \rho^S - \frac{\tau}{1-\tau}r.$$

[14] Note that we use the term "earnings net of taxes" rather than "earnings after taxes." We feel that to avoid confusion the latter term should be reserved to describe what will actually appear in the firm's accounting statements, namely the net cash flow including the tax savings on the interest (our $\bar{X}^\tau$). Since financing sources cannot in general be allocated to particular investments (see below), the after-tax or accounting concept is not useful for capital budgeting purposes, although it can be extremely useful for valuation equations as we saw in the previous section.

[15] Remember that when we speak of the minimum required yield on an investment we are referring in principle only to investments which increase the *scale* of the firm. That is, the new

Thus for borrowed funds (or any other tax-deductible source of capital) the marginal cost or before-tax required rate of return is simply the market rate of capitalization for net of tax unlevered streams and is thus independent of both the tax rate and the interest rate. This required rate is lower than that implied by our original (33), but still considerably higher than that implied by the traditional view (see esp. pp. 276–77 of our paper) under which the before-tax cost of borrowed funds is simply the interest rate, r.

Having derived the above expressions for the marginal costs of debt and equity financing it may be well to warn readers at this point that these expressions represent at best only the hypothetical extremes insofar as costs are concerned and that neither is directly usable as a cut-off criterion for investment planning. In particular, care must be taken to avoid falling into the famous "Liquigas" fallacy of concluding that if a firm intends to float a bond issue in some given year then its cut-off rate should be set that year at ρ^D; while, if the next issue is to be an equity one, the cut-off is ρ^S. The point is, of course, that no investment can meaningfully be regarded as 100 per cent equity financed if the firm makes any use of debt capital—and most firms do, not only for the tax savings, but for many other reasons having nothing to do with "cost" in the present static sense (cf. our original paper pp. 292–93). And no investment can meaningfully be regarded as 100 per cent debt financed when lenders impose strict limitations on the maximum amount a firm can borrow relative to its equity (and when most firms actually plan on normally borrowing less than this external maximum so as to leave themselves with an emergency reserve of unused borrowing power). Since the firm's long-run capital structure will thus contain both debt and equity capital, investment planning must recognize that, over the long pull, *all* of the firm's assets are really financed by a mixture of debt and equity capital even though only one kind of capital may be raised in any particular year. More precisely, if L^* denotes the firm's long-run "target" debt ratio (around which its actual debt ratio will fluctuate as it "alternately" floats debt issues and retires them with internal or external equity) then the firm can assume, to a first approximation at least, that for any particular investment $dD/dI = L^*$. Hence, the relevant marginal cost of capital for investment planning, which we shall here denote by ρ^*, is:

$$\rho^* = \frac{1 - \tau L^*}{1 - \tau} \rho^\tau = \rho^S - \frac{\tau}{1 - \tau} \rho^D L^* = \rho^S(1 - L^*) + \rho^D L^*.$$

That is, the appropriate cost of capital for (repetitive) investment decisions over time is, to a first approximation, a weighted average of the costs of debt and equity financing, the weights being the proportions of each in the "target" capital structure.[16]

assets must be in the same "class" as the old. See in this connection, J. Hirshleifer, "Risk, the Discount Rate and Investment Decisions," *Am. Econ. Rev.*, May 1961, *51*, 112–20 (especially pp. 119–20). See also footnote 16.

[16] From the formulas in the text one can readily derive corresponding expressions for the required net-of-tax yield, or net-of-tax cost of capital for any given financing policy. Specifi-

V. *Some Concluding Observations*

Such, then, are the major corrections that must be made to the various formulas and valuation expressions in our earlier paper. In general, we can say that the force of these corrections has been to increase somewhat the estimate of the tax advantages of debt financing under our model and consequently to reduce somewhat the quantitative difference between the estimates of the effects of leverage under our model and under the naive traditional view. It may be useful to remind readers once again that the existence of a tax advantage for debt financing—even the larger advantage of the corrected version—does not necessarily mean that corporations should at all times seek to use the maximum possible amount of debt in their capital structures. For one thing, other forms of financing, notably retained earnings, may in some circumstances be cheaper still when the tax status of investors under the personal income tax is taken into account. More important, there are, as we pointed out, limitations imposed by lenders (see pp. 292–93), as well as many other dimensions (and kinds of costs) in real-world problems of financial strategy which are not fully comprehended within the framework of static equilibrium models, either our own or those of the traditional variety. These additional considerations, which are typically grouped under the rubric of "the need for preserving flexibility," will normally imply the maintenance by the corporation of a substantial reserve of untapped borrowing power. The tax advantage of debt may well tend to lower the optimal size of that reserve, but it is hard to believe that advantages of the size contemplated under our model could justify any substantial reduction, let alone their complete elimination. Nor do the data

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cally, let $\tilde{\rho}(L)$ denote the required net-of-tax yield for investment financed with a proportion of debt $L=dD/dI$. (More generally L denotes the proportion financed with tax deductible sources of capital.) Then from (7) we find:

$$\tilde{\rho}(L)=(1-\tau)\frac{d\bar{X}}{dI}=(1-L\tau)\rho^{\tau} \tag{8}$$

and the various costs can be found by substituting the appropriate value for L. In particular, if we substitute in this formula the "target" leverage ratio, L^*, we obtain:

$$\tilde{\rho}^*\equiv\tilde{\rho}(L^*)=(1-\tau L^*)\rho^{\tau}$$

and $\tilde{\rho}^*$ measures the average net-of-tax cost of capital in the sense described above.

Although the before-tax and the net-of-tax approaches to the cost of capital provide equally good criteria for investment decisions when assets are assumed to generate perpetual (i.e., non-depreciating) streams, such is not the case when assets are assumed to have finite lives (even when it is also assumed that the firm's assets are in a steady state age distribution so that our X or EBIT is approximately the same as the net cash flow before taxes). See footnote 3 above. In the latter event, the correct method for determining the desirability of an investment would be, in principle, to discount the net-of-tax stream at the net-of-tax cost of capital. Only under this net-of-tax approach would it be possible to take into account the deductibility of depreciation (and also to choose the most advantageous depreciation policy for tax purposes). Note that we say that the net-of-tax approach is correct "in principle" because, strictly speaking, nothing in our analysis (or anyone else's, for that matter) has yet established that it is indeed legitimate to "discount" an uncertain stream. One can hope that subsequent research will show the analogy to discounting under the certainty case is a valid one; but, at the moment, this is still only a hope.

indicate that there has in fact been a substantial increase in the use of debt (except relative to preferred stock) by the corporate sector during the recent high tax years.[17]

As to the differences between our modified model and the traditional one, we feel that they are still large in quantitative terms and still very much worth trying to detect. It is not only a matter of the two views having different implications for corporate financial policy (or even for national tax policy). But since the two positions rest on fundamentally different views about investor behavior and the functioning of the capital markets, the results of tests between them may have an important bearing on issues ranging far beyond the immediate one of the effects of leverage on the cost of capital.

FRANCO MODIGLIANI AND MERTON H. MILLER*

[17] See, e.g., Merton H. Miller, "The Corporate Income Tax and Corporate Financial Policies," in *Staff Reports to the Commission on Money and Credit* (forthcoming).

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Consumption, Savings and Windfall Gains: Comment

In her recent article in this *Review* [3], Margaret Reid attempted to answer previous articles by Bodkin [1] and Jones [2] challenging the validity of the permanent income hypothesis. Bodkin and Jones used income and expenditure data for those consumer units who had received the soldiers' bonus (National Service Life Insurance dividends) during 1950, the year of the urban consumption survey [4]. These bonuses were regarded as windfall gains for the purposes of their analyses.

Professor Reid used data from the same survey, but her windfall gains were represented by "other money receipts." These are defined as "inheritances and occasional large gifts of money from persons outside the family . . . and net receipts from the settlement of fire and accident policies" [4, Vol. 1, p. xxix]. She assumed that the soldiers' bonus was included, and that it accounted for about one-half of other money receipts. Here she made an unfortunate mistake in interpreting the data for the main critical purpose of her article.

The soldiers' bonus is not part of "other money receipts" (O) but rather a part of "disposable money income" (Y). It is the main part of an item in the disposable money income category called "military pay, allotments, and pensions" [4, Vol. 11, p. xxix].

This would appear to alter completely the relationship of Professor Reid's main findings to the Bodkin results and to change the windfall interpretation of the O variable. Surely, fire and accident policy settlements are not windfall income, but rather a (partial) recovery of real assets previously lost. Likewise, inheritances are probably best considered as a long-anticipated increase in assets—not an increase in transitory income.

The discovery of this error probably does not affect whatever importance Professor Reid's secondary finding may have: ". . . the need, in any study of

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TABLE OF CONTENTS

Consensus Looks For At Least Two FOMC Rate Hikes This Year

Domestic Commentary Words and deeds from the Federal Reserve's Open Market Committee (FOMC) and its members over the past couple of weeks have left many an analyst and market participant a bit dazed and confused about policymakers' intentions and may have contributed to the recent halt of the sharp rebound in prices for risk assets that has occurred since early February.

As widely expected, the FOMC left interest rates unchanged at its March 15th-16th meeting. Only Kansas City Fed bank president Esther George – the FOMC's most noted hawk – dissented again in favor of a rate hike. But despite the recent strength of job growth, rising core inflation, diminished concerns about China, and the rebound in the prices of risk assets and crude oil, the March policy statement was more dovish than anticipated, the updated "dot plot" cut to two from four the median expectation for rate hikes this year, and FOMC chair Janet Yellen's press conference seemed to stress more caution than confidence in the Fed's outlook.

A week, later, however, a bevy of Fed speakers, including Atlanta Fed bank president James Lockhart, Richmond Fed bank president Jeffrey Lacker, Saint Louis Fed bank president James Bullard, Philadelphia Fed president Patrick Harker, San Francisco Fed president John Williams, and most notably Chicago Fed bank president Charles Evans, expressed comments that were hawkish, indicating, it seemed, some general impatience with the pace at which the Fed is moving to normalize rates. While many are currently non-voting members of the FOMC, Bullard – a bellwether for many Fed watchers and a current voting member – suggested that markets were mispricing the Fed's intention to raise interest rates this year and appeared to reverse his earlier concerns about global economic instability and uncomfortably low inflation expectations. Harker and Williams went so far as to suggest that the FOMC should consider a hike at its late-April meeting. However, it was comments from Evans – a long-time dove who has advocated maintaining an easier policy for a much longer period of time – that garnered the most attention when he noted that two rate increases this year "were not unreasonable".

In the wake of the FOMC's March meeting and follow-up comments from various Fed speakers, 100% of our panelists that responded to a special question during our March 23rd-24th survey said they still believe the next move by the FOMC will be a rate hike. All but one of the panelists thinks the next rate hike will occur this year. Despite recent comments from a couple of FOMC members that a rate hike at the FOMC's April 26th-27th meeting might be appropriate, none of the panelists this month predicted such a move. Instead, 86.0% of the panelists forecast that the first rate hike of 2016 will be announced at the June 14th-15th meeting. Among those looking for a later move, 4.7% said the first hike will occur at the July 26th-27th meeting, 4.7% said it would take place at the September 20th-21st conclave, and 2.3% said the FOMC would wait until its December 13th-14th meeting to enact its first hike of this year. One panelist predicts that no hike will occur until sometime after Q3 2017.

The consensus now predicts the mid-point of the federal funds rate target range will be 0.932% at the end of 2016. That compares with last month's prediction of 1.019%, the February prediction of 1.140%, and the January estimate of 1.218%. The forecast implies slightly more than two quarter-point rate hikes this year but less than three. This compares with the "dot plot" released in conjunction with the FOMC's March meeting that implied two quarter-point rate increases in 2016 versus the four hikes suggested by the FOMC's December "dot plot". As has been the case for some time, prices in the federal funds futures market suggest fewer rates hikes this year than does the consensus forecast or the FOMC's most recent dot plot.

The consensus forecast of the mid-point of the federal funds rate target range at the end of 2017 slipped to 1.865% this month compared to 1.917% in March, 2.190% in February, and 2.324% in January. The current estimate implies close to, but not quite four additional quarter-point increases by the FOMC in 2017. That comes very close to duplicating the four expected 2017 increases implied by the FOMC's "dot plot" from its December and March meetings. Asked what were the odds that circumstances will ultimately prompt the FOMC to reverse course and cut its target for the federal funds rate back to the zero bound by the end of 2017, the consensus forecast this month slipped for a third time to 18.8% versus 22.1% last month and the February estimate of 22.5%.

The consensus now predicts real GDP grew 1.9% (q/q,saar) in Q1 of this year and will increase 2.3% in Q2, both estimates 0.2 of a percentage point slower than forecast a month ago. This compares with the final estimate from the Bureau of Economic Analysis (BEA) that real GDP grew 1.4% (q/q,saar) in Q4 2015, 0.4 of a percentage point faster than BEA's prior estimate. The upward revision to Q4 2015 growth was better than expected by most analysts. Accounting for the upward revision was stronger growth in personal consumption expenditures, residential investment, government spending and investment, and less drag from net exports that offset a larger than previously estimated contraction in business fixed investment and a downward revision to private inventories.

In Q1 of this year, GDP is expected to be supported by a real PCE growth rate about on par with the 2.4% (q/q,saar) seen in the prior quarter. Business fixed investment is expected to contract once again, as declines in equipment spending and nonresidential structures offsets trend-like growth in intellectual property products. Residential investment is expected to grow, but at a slower pace than in Q4. Net exports and business inventories will each likely subtract about a quarter of a percentage point from real GDP's rate of growth in Q1. Real GDP still is expected by the consensus to grow 2.5% (q/q,saar) in Q3 and 2.4% in Q4 of this year. Also unchanged was the consensus forecast that real GDP will grow 2.4% (q/q,saar) in Q1 and Q2 of 2017, but the panel's initial estimate of growth in Q3 2017 growth came in at 2.3%. Asked the odds of a U.S. recession this year, the consensus forecast fell to 16.2% from 19.0% in March and 16.7% in February. The consensus this month put the odds of a recession in 2017 at 21.4% versus 23.2% in March and 22.0% in February.

Consensus forecasts of inflation over the forecast horizon were little changed this month. The consumer price index is projected to have increased 0.1% (q/q,saar) in Q1, 0.1 of a percentage point slower than a month ago. It is still forecast to increase 1.9% in Q2, while the forecast of its Q3 change slipped by 0.1 of a point to 2.2%. It is forecast to increase 2.3% in Q4 of this year and Q1 of next year and 2.4% in Q2 2017. It is projected to increase 2.3% in Q3 2017. The consensus forecast of the Q1 2016 change in the GDP price index remained at 1.1% (q/q,saar) this month, but the Q2 and Q3 estimates slipped by 0.1 of a percentage point to 1.7% and 1.8%, respectively. Consensus forecasts of its change over the remainder of the forecast horizon went unchanged, hovering in the vicinity of 2.0%.

Consensus Forecast The consensus predicts real GDP growth rebounded to an annual rate of about 2.0% (q/q,saar) in Q1 of this year and will grow at an above-trend pace of about 2.4% over the rest of 2016 and the first three quarters of 2017. That will be enough to drive unemployment lower this year and next. Consumer price inflation has bottomed and will likely increase at about a 2.0% y/y rate by this summer. The Fed will hike rates at least two times this year and more in 2017. Treasury yields are expected to rise, but modestly, the increase held down by exceedingly low yields abroad *(see page 2).*

Special Questions The consensus predicts the price index for personal consumption expenditures (PCE) will increase 1.65% on a December-over-December basis this year and that the core PCE price index will increase 1.88% *(see page 14)*

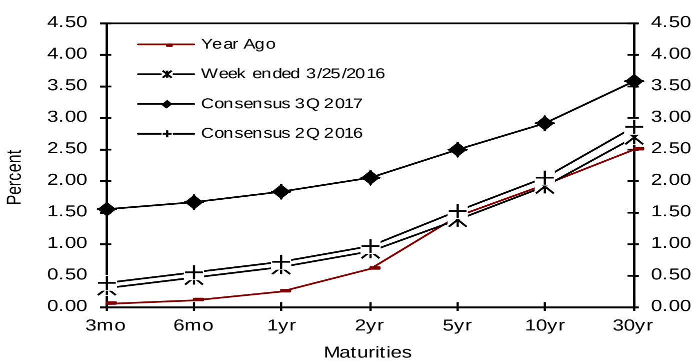
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			*Latest Qtr*						
Interest Rates	Mar. 25	Mar. 18	Mar. 11	Mar. 4	Feb.	Jan.	Dec.	*1Q2016**	**2Q 2016**	**3Q 2016**	**4Q 2016**	**1Q 2017**	**2Q 2017**	**3Q 2017**
Federal Funds Rate	0.37	0.36	0.36	0.36	0.38	0.34	0.16	*0.36*	**0.5**	**0.6**	**0.8**	**1.0**	**1.3**	**1.5**
Prime Rate	3.25	3.50	3.50	3.50	3.50	3.50	3.29	*3.47*	**3.6**	**3.7**	**3.9**	**4.1**	**4.4**	**4.6**
LIBOR, 3-mo.	0.62	0.63	0.63	0.63	0.62	0.61	0.41	*0.62*	**0.7**	**0.9**	**1.0**	**1.3**	**1.6**	**1.8**
Commercial Paper, 1-mo.	0.34	0.33	0.34	0.35	0.35	0.34	0.17	*0.34*	**0.5**	**0.7**	**0.9**	**1.1**	**1.4**	**1.7**
Treasury bill, 3-mo.	0.30	0.32	0.31	0.32	0.31	0.26	0.13	*0.29*	**0.4**	**0.6**	**0.8**	**1.0**	**1.3**	**1.6**
Treasury bill, 6-mo.	0.46	0.48	0.49	0.48	0.45	0.43	0.31	*0.45*	**0.5**	**0.7**	**0.9**	**1.2**	**1.4**	**1.7**
Treasury bill, 1 yr.	0.63	0.67	0.68	0.66	0.53	0.54	0.25	*0.58*	**0.7**	**0.9**	**1.1**	**1.3**	**1.6**	**1.8**
Treasury note, 2 yr.	0.87	0.91	0.92	0.84	0.73	0.90	0.83	*0.84*	**1.0**	**1.2**	**1.4**	**1.6**	**1.8**	**2.0**
Treasury note, 5 yr.	1.38	1.43	1.42	1.32	1.22	1.52	1.59	*1.38*	**1.5**	**1.7**	**1.9**	**2.1**	**2.3**	**2.5**
Treasury note, 10 yr.	1.91	1.93	1.91	1.82	1.78	2.09	2.19	*1.93*	**2.0**	**2.2**	**2.4**	**2.6**	**2.8**	**2.9**
Treasury note, 30 yr.	2.69	2.71	2.69	2.67	2.62	2.86	2.96	*2.73*	**2.8**	**3.0**	**3.1**	**3.3**	**3.5**	**3.6**
Corporate Aaa bond	3.78	3.80	3.88	3.89	3.96	4.00	3.99	*3.93*	**3.9**	**4.1**	**4.3**	**4.5**	**4.6**	**4.8**
Corporate Baa bond	5.04	5.13	5.25	5.32	5.32	5.45	5.42	*5.30*	**5.3**	**5.4**	**5.5**	**5.7**	**5.8**	**5.9**
State & Local bonds	3.38	3.40	3.42	3.34	3.30	3.41	3.64	*3.37*	**3.5**	**3.7**	**3.8**	**3.9**	**4.1**	**4.2**
Home mortgage rate	3.71	3.73	3.68	3.64	3.66	3.87	3.90	*3.75*	**3.9**	**4.0**	**4.2**	**4.4**	**4.6**	**4.8**

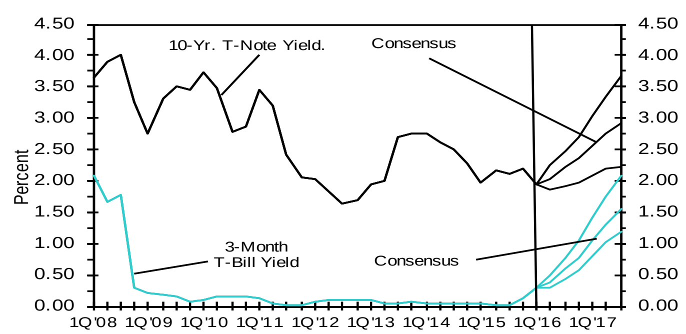
	History								Consensus Forecasts-Quarterly					
Key Assumptions	2Q 2014	3Q 2014	4Q 2014	1Q 2015	2Q 2015	3Q 2015	4Q 2015	*1Q 2016**	**2Q 2016**	**3Q 2016**	**4Q 2016**	**1Q 2017**	**2Q 2017**	**3Q 2017**
Major Currency Index	76.6	77.8	82.6	89.4	89.9	91.8	93.1	*92.0*	**92.9**	**93.3**	**93.7**	**93.7**	**92.9**	**93.2**
Real GDP	4.6	4.3	2.1	0.6	3.9	2.0	1.4	*1.9*	**2.3**	**2.5**	**2.4**	**2.4**	**2.4**	**2.3**
GDP Price Index	2.2	1.6	0.1	0.1	2.1	1.3	0.9	*1.1*	**1.7**	**1.8**	**1.9**	**2.0**	**2.1**	**2.1**
Consumer Price Index	1.9	0.9	-0.3	-2.9	2.4	1.4	0.8	*0.1*	**1.9**	**2.1**	**2.3**	**2.3**	**2.4**	**2.3**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS). **Interest rate data for 1Q 2016 based on historical data through the week ended March 25th.* *Data for 1Q 2016 Major Currency Index is based on data through week ended March 18th. Figures for 1Q 2016 Real GDP, GDP Chained Price Index and Consumer Price Index are consensus forecasts based on a special question asked of the panelists' this month*

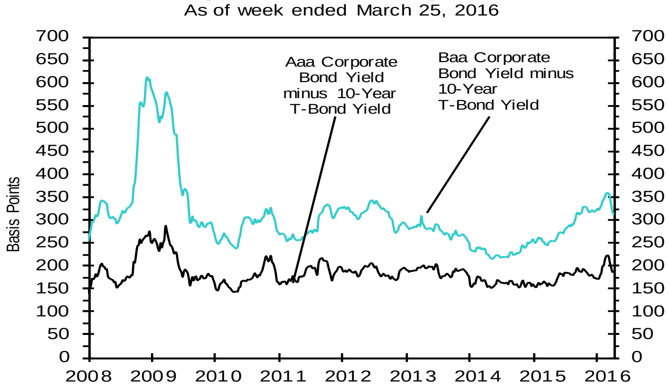
U.S. Treasury Yield Curve
Week ended March 25, 2016 and Year Ago vs.
2Q 2016 and 3Q 2017 Consensus Forecasts



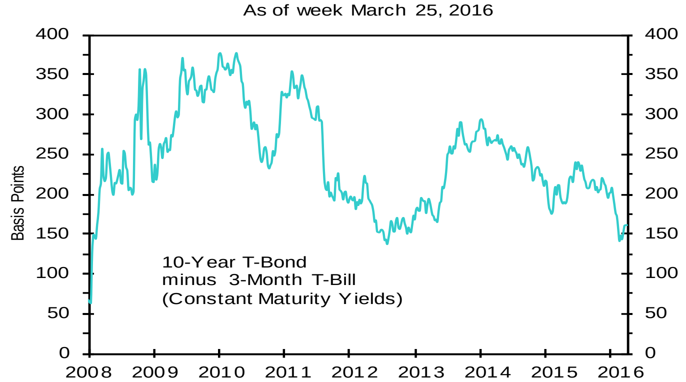
U.S. 3-Mo. T-Bills & 10-Yr. T-Note Yield
(Quarterly Average) Forecast



Corporate Bond Spreads
As of week ended March 25, 2016



U.S. Treasury Yield Curve
As of week March 25, 2016



3-Month Interest Rates[1]

	History: Latest	History: Month Ago	History: Year Ago	Consensus Forecasts Months From Now: 3	6	12
U.S.	0.62	0.62	0.27	**0.78**	**0.88**	**1.13**
Japan	-0.01	0.01	0.10	**0.00**	**-0.02**	**-0.05**
U.K.	0.57	0.57	0.53	**0.62**	**0.63**	**0.95**
Switzerland	-0.73	-0.77	-0.79	**-0.80**	**-0.80**	**-0.90**
Canada	0.83	0.81	0.88	**0.69**	**0.69**	**0.75**
Australia	2.38	2.32	2.47	**2.10**	**1.90**	**1.90**
Eurozone	-0.24	-0.19	0.02	**-0.27**	**-0.28**	**-0.29**

10-Yr. Government Bond Yields[2]

	History: Latest	History: Month Ago	History: Year Ago	Consensus Forecasts Months From Now: 3	6	12
U.S.	1.91	1.75	1.90	**2.01**	**2.07**	**2.42**
Germany	0.21	0.19	0.23	**0.34**	**0.38**	**0.67**
Japan	-0.09	0.00	0.31	**-0.02**	**-0.06**	**0.11**
U.K.	1.54	1.43	1.64	**1.63**	**1.76**	**2.06**
France	0.57	0.54	0.50	**0.70**	**0.73**	**1.16**
Italy	1.26	1.54	1.34	**1.45**	**1.51**	**1.85**
Switzerland	-0.38	-0.37	-0.08	**-0.33**	**-0.24**	**0.12**
Canada	1.33	1.13	1.35	**1.40**	**1.50**	**1.80**
Australia	2.60	2.43	2.33	**2.60**	**2.61**	**2.85**
Spain	1.52	1.63	1.29	**1.53**	**1.58**	**1.91**

Foreign Exchange Rates[1]

	History: Latest	History: Month Ago	History: Year Ago	Consensus Forecasts Months From Now: 3	6	12
U.S.	90.056	92.744	91.687	**94.5**	**94.6**	**79.9**
Japan	111.38	112.42	120.28	**116.1**	**117.3**	**124.2**
U.K.	1.4514	1.4343	1.4933	**1.40**	**1.44**	**1.45**
Switzerland	0.9682	0.9893	0.9766	**1.02**	**1.04**	**1.05**
Canada	1.2980	1.3798	1.2593	**1.40**	**1.40**	**1.35**
Australia	0.7618	0.7125	0.7759	**0.69**	**0.69**	**0.71**
Euro	1.1292	1.1127	1.0792	**1.09**	**1.07**	**1.06**

Consensus 3-Month Rates vs. U.S. Rate

	Now	In 12 Mo.
Japan	-0.63	**-1.17**
U.K.	-0.05	**-0.18**
Switzerland	-1.35	**-2.03**
Canada	0.21	**-0.38**
Australia	1.76	**0.78**
Eurozone	-0.86	**-1.41**

Consensus 10-Year Gov't Yields vs. U.S. Yield

	Now	In 12
Germany	-1.70	**-1.75**
Japan	-2.00	**-2.31**
U.K.	-0.37	**-0.36**
France	-1.34	**-1.26**
Italy	-0.65	**-0.57**
Switzerland	-2.29	**-2.30**
Canada	-0.58	**-0.63**
Australia	0.69	**0.43**
Spain	-0.39	**-0.52**

Forecasts of panel members are on pages 10 and 11. Definitions of variables are as follows: [1]Three month rate on interest-earning money market deposits denominated in selected currencies. [2]Government bonds are yields to maturity. Foreign exchange rate forecasts for U.K., Australia and the Euro are U.S. dollars per currency unit. For the U.S dollar, forecasts are of the U.S. Federal Reserve Board's Major Currency Index.

International Commentary The powerful rally in global risk assets that began in mid-February continued through the third week of March before running out of steam. This powerful rebound followed the carnage witnessed earlier in the year when worries about China, plunging oil prices, the strength of the U.S. dollar, and faltering forecasts of global economic growth sent prices for risk assets reeling and brought a safe-haven bid to sovereign debt markets. The plunge in prices for risk asset served to reshape expectations of future policy moves by major central banks, leading analysts and market participants to assume that policymakers would work to keep interest rates lower, and for longer, than thought at the beginning of this year.

At its March 10th meeting the European Central Bank cut its main refinancing rate to zero and its deposit rate to -0.4 percent. The bank also extended its monthly asset purchases to 80 billion euros, to take effect in April. Additionally, the ECB will add investment grade euro-denominated bonds issued by non-bank corporations to the assets it can purchase. These purchases will start towards end of the first half of 2016. The bank also said that in June it will launch a new series of four targeted longer-term refinancing operations (TLTROs) with maturities of four years. Draghi downplayed the likelihood of pushing interest rates further into negative territory, robbing the ECB's action from some of its intended impact. The ECB also announced that it had cut its forecasts of economic growth and inflation for this year and next. At present, it looks as if real GDP growth in the currency zone during Q1 was somewhere on the order of 2.0% (q/q,saar); an improvement over the 1.3% pace seen in the final quarter of 2015. However, sustaining even this modest pace may prove difficult over coming quarters given the various headwinds confronting the Eurozone. While headline consumer price inflation in the Eurozone rose a greater than expected 0.2% in February it remained a negative 0.2% y/y.

The Bank of England's Monetary Policy Committee (MPC) kept its overnight policy rate unchanged for an 84th consecutive month at its March 17th meeting and for a second month the vote was unanimous. While the MPC continues to suggest that the next move in interest rates is up the key quote from the meeting was that "All members agree that, given the likely persistence of the headwinds weighing on the economy, when Bank Rate does begin to rise, it is expected to do so more gradually and to a lower level than in recent cycles." Private domestic demand remains fairly healthy, but inflation remains low, increasing only 0.3% y/y in February. The darker cloud on the horizon for the BoE is the June 23rd Brexit referendum. Polls have tightened considerably over the past year and the recent terrorist attack in Brussels may tighten them further. The BoE's latest policy statement signaled that uncertainty about a Brexit was "likely to have been a significant driver of the decline in sterling". Most analysts believe the U.K. will stay in the E.U, but uncertainty ahead of the vote is likely to roil markets if polls continue to tighten. Many analysts worry that a vote by the U.K. to leave the E.U. could send global markets into a tailspin and threaten the very existence of the Eurozone.

The Bank of Japan (BoJ) left policy unchanged at its mid-March meeting, but minutes revealed that there was discussion of reversing the surprise January imposition of a negative interest rate on excess reserves held by financial institutions on account at the BoJ. One BoJ member said the decision had added to doubts over the BOJ's ability to expand its quantitative easing program, stoking concern among banks and depositors. Another noted that "withdrawal" from negative rates is "preferable," but that doing so could "confuse the markets and impair the credibility" of the BOJ. Nonetheless, an actual reversal of the January action seems unlikely. Manufacturing activity and exports were weak in Q1 of this year and real GDP may have contracted once again, but not by as much as in Q4 2015.

Policy at the Reserve Bank of Australia and the Bank of Canada is expected to remain on hold this year unless growth and inflation falter anew *(see pages 10-11 for individual panelists' forecasts).*

Second Quarter 2016

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	Percent Per Annum -- Average For Quarter: Short-Term 1 Federal Funds Rate	2 Prime Bank Rate	3 LIBOR Rate 3-Mo.	4 Com. Paper 1-Mo.	5 Treas. Bills 3-Mo.	6 Treas. Bills 6-Mo.	7 Treas. Bills 1-Yr.	Intermediate-Term 8 Treas. Notes 2-Yr.	9 Treas. Notes 5-Yr.	10 Treas. Notes 10-Yr.	Long-Term 11 Treas. Bond 30-Yr.	12 Aaa Corp. Bond	13 Baa Corp. Bond	14 State & Local Bonds	15 Home Mtg. Rate	Avg. For Qtr. A. Fed's Major Currency $ Index	(Q-Q % Change) (SAAR) B. Real GDP	C. GDP Price Index	D. Cons. Price Index
Scotiabank Group	0.8 H	na	na	na	0.6 H	na	na	1.4 H	2.0 H	2.3 H	3.0	na	na	na	na	na	2.5	1.8	1.2
Nomura Securities, Inc.	0.6	3.6	0.8	0.8 H	na	na	na	1.2	1.7	2.2	2.8	4.4 H	5.8 H	na	4.1	na	1.9	1.6	1.5
Bank of America Merrill Lynch	0.6	na	0.7	na	0.4	na	na	0.9	1.4	1.9	2.8	na	na	na	na	na	2.3	1.9	3.5
RBC	0.6	na	na	na	0.4	na	na	1.1	1.6	2.1	2.9	na	na	na	na	na	2.8	2.6	2.9
Barclays Capital	0.6	3.8 H	0.9 H	na	na	na	na	1.1	1.5	1.9	2.7	na	na	na	na	na	2.0	3.1 H	3.8 H
Cycledata Corp.	0.6	3.7	0.8	0.5	0.4	0.6	0.7	0.9	1.5	2.0	2.8	4.1	5.3	3.4	3.8	93.0	2.2	1.8	2.1
SunTrust Banks	0.6	3.6	0.8	0.5	0.5	0.6	0.7	1.0	1.5	2.0	2.7	3.9	5.3	3.9 H	4.0	na	3.2	1.5	1.4
Stone Harbor Investment Partners	0.5	3.7	0.8	0.6	0.5	0.6	0.7	1.1	1.6	2.1	2.9	3.8	4.4 L	na	3.6	94.0	3.1	1.8	1.9
Moody's Analytics	0.5	3.7	0.8	0.5	0.3	0.4	0.6	0.9	1.6	2.3 H	3.0	3.9	5.3	na	4.0	na	2.6	0.5	2.2
Wells Capital Management	0.5	3.7	0.7	0.4	0.4	0.6	0.9	1.0	1.5	2.1	2.8	4.0	5.4	3.6	3.9	95.0	2.4	1.8	1.2
Nat'l Assn. of Realtors	0.5	3.5 L	0.7	0.5	0.4	0.6	0.8	1.0	1.6	2.1	2.9	4.0	5.4	3.6	4.1	na	1.9	2.0	1.3
Chase Wealth Management	0.5	3.6	0.6	0.6	0.5	0.6	0.9	1.1	1.5	2.1	2.9	3.9	5.2	3.6	3.9	90.2	2.3	1.9	2.0
Swiss Re	0.5	3.5 L	0.6	0.3 L	0.2 L	0.3 L	0.6	0.9	1.7	2.3 H	3.2 H	4.1	5.3	na	4.1	na	2.9	1.3	2.3
Goldman Sachs & Co.	0.5	na	0.8	na	0.4	na	na	1.0	1.9	2.2	3.1	na	na	na	4.3 H	na	2.3	1.9	2.4
J.P. Morgan Chase	0.5	na	0.7	na	na	na	na	0.9	1.4	1.9	2.7 L	na	na	na	na	na	2.3	1.9	2.5
MacroFin Analytics	0.5	3.6	0.7	0.5	0.4	0.5	0.7	0.9	1.5	2.0	2.9	4.0	5.2	3.5	3.8	91.8	2.2	1.6	1.6
BMO Capital Markets	0.5	3.6	0.7	na	0.4	0.6	0.8	1.0	1.5	2.0	2.8	na	na	na	3.9	94.6	2.8	1.9	2.0
GLC Financial Economics	0.5	3.6	0.7	0.5	0.4	0.5	0.6	0.8	1.4	1.9	2.7 L	4.2	5.6	3.5	3.6 L	91.9	2.7	1.7	2.1
Standard & Poor's Corp.	0.5	3.7	0.8	na	0.4	0.6	0.9	1.0	1.6	2.2	3.0	3.2 L	4.9	na	3.9	94.0	1.9	2.2	-1.2 L
DePrince & Associates	0.5	3.5 L	0.7	0.5	0.4	0.6	0.8	1.1	1.5	2.1	2.8	3.8	5.0	3.5	3.8	93.9	2.5	1.7	1.8
Chmura Economics & Analytics	0.5	3.6	0.7	0.5	0.4	0.6	0.8	1.0	1.5	2.0	2.8	4.0	na	na	3.8	89.3 L	3.1	1.5	2.3
Loomis, Sayles & Company	0.5	3.5 L	0.6	0.5	0.4	0.5	0.7	1.0	1.6	2.1	2.8	4.0	5.5	3.4	3.8	92.7	1.9	1.9	2.4
Economist Intelligence Unit	0.4 L	3.5 L	0.6	0.4	0.3	0.5	0.6	0.8	1.3	2.0	2.8	na	na	na	3.8	na	1.6	na	0.5
The Northern Trust Company	0.4 L	3.6	0.6	0.4	0.3	0.5	0.6	0.9	1.6	2.1	2.9	3.9	5.2	3.5	3.8	na	2.2	-0.4 L	-0.3
RBS Securities	0.4 L	3.6	0.7	0.4	0.4	0.6	0.7	1.1	1.7	2.2	3.0	4.0	5.2	3.7	3.9	94.0	2.3	2.5	2.2
Moody's Capital Markets Group	0.4 L	3.6	0.7	0.5	0.4	0.6	0.7	0.9	1.5	2.1	2.9	4.0	5.2	3.6	3.8	91.0	1.7	1.7	0.9
PNC Financial Services Corp.	0.4 L	3.6	0.8	na	0.5	0.5	0.7	1.0	1.6	2.1	2.8	na	5.4	3.6	3.9	93.5	2.5	1.1	1.4
Regions Financial Corporation	0.4 L	3.5 L	0.7	0.5	0.4	0.7 H	0.7	0.9	1.4	2.1	2.9	4.0	5.3	na	3.9	92.1	2.6	1.5	1.5
Fannie Mae	0.4 L	3.5 L	na	na	0.5	0.6	0.8	1.0	1.5	2.0	2.8	na	na	na	3.8	na	1.9	1.8	1.6
Georgia State University	0.4 L	3.6	na	na	0.4	0.4	0.6	0.8	1.5	2.1	2.9	4.0	5.0	na	4.0	na	2.5	1.9	1.7
Comerica Bank	0.4 L	3.5 L	0.7	na	0.3	0.6	0.7	1.0	1.4	1.9	2.8	na	na	na	3.7	na	1.9	1.2	2.4
Amherst Pierpont Securities	0.4 L	3.6	0.9 H	0.5	0.4	0.7 H	1.0 H	1.2	1.8	2.3 H	3.1	4.2	5.5	3.8	4.1	93.5	2.6	1.8	3.3
RidgeWorth Investments	0.4 L	3.5 L	0.8	0.5	0.3	0.5	0.6	1.1	1.7	2.3 H	3.1	4.2	5.7	3.5	4.1	95.0	2.0	1.5	1.8
High Frequency Economics	0.4 L	3.5 L	na	na	0.3	0.6	0.7	0.9	1.4	2.3 H	3.1	na	na	na	na	na	2.5	2.3	2.3
Woodworth Holdings	0.4 L	3.5 L	0.6	0.4	0.4	0.5	0.7	0.9	1.4	2.0	2.8	3.9	5.1	3.4	3.8	91.0	2.5	0.5	0.8
DS Economics	0.4 L	3.5 L	0.6	0.4	0.3	0.5	0.6	0.9	1.5	2.0	2.8	4.0	5.4	3.5	3.9	93.0	2.0	1.8	1.6
Daiwa Capital Markets America	0.4 L	3.6	0.7	0.5	0.4	0.5	0.6	1.0	1.5	1.9	2.7 L	3.9	5.1	3.3 L	3.8	92.0	2.1	1.7	1.8
Wells Fargo	0.4 L	3.5 L	0.5	0.5	0.5	0.6	0.7	0.9	1.4	2.0	2.8	3.9	5.2	3.4	3.9	92.5	2.3	1.8	1.9
RDQ Economics	0.4 L	3.5 L	0.6	0.4	0.4	0.6	0.7	0.8	1.4	2.0	2.7 L	3.8	5.3	3.4	3.7	94.7	2.2	1.7	2.7
Oxford Economics	0.4 L	3.6	na	na	0.3	0.5	0.8	0.9	1.5	2.0	na	na	na	na	3.9	95.8 H	2.7	2.0	2.3
Societe Generale	0.4 L	3.5 L	0.6	na	na	na	na	0.7 L	1.2 L	1.6 L	3.0	na	na	na	na	na	2.1	2.1	2.4
BNP Paribas Americas	0.4 L	na	0.7	na	na	na	na	0.8	1.2 L	1.8	na	na	na	na	na	na	2.1	na	3.1
UBS AG	0.4 L	na	0.6	na	0.3	na	na	na	na	1.9	na	na	na	na	na	na	1.3 L	2.3	3.6
MUFG Union Bank	0.4 L	3.5 L	0.7	0.4	0.3	0.5	0.6	0.9	1.5	2.0	2.7 L	3.6	5.0	3.4	3.8	92.0	2.6	2.2	2.7
Action Economics	0.4 L	3.5 L	0.4 L	0.4	0.3	0.5	0.5 L	0.8	1.3	1.9	2.7 L	4.0	5.4	3.4	3.8	na	1.8	0.3	1.5
Naroff Economic Advisors	0.4 L	3.5 L	0.7	0.4	0.3	0.5	0.7	1.0	1.5	2.0	2.8	3.8	5.2	3.5	3.8	91.5	3.8 H	1.7	1.9
April Consensus	**0.5**	**3.6**	**0.7**	**0.5**	**0.4**	**0.5**	**0.7**	**1.0**	**1.5**	**2.0**	**2.8**	**3.9**	**5.3**	**3.5**	**3.9**	**92.9**	**2.3**	**1.7**	**1.9**
Top 10 Avg.	0.6	3.7	0.8	0.6	0.5	0.6	0.8	1.1	1.7	2.2	3.0	4.1	5.5	3.6	4.1	94.4	3.0	2.3	3.1
Bottom 10 Avg.	0.4	3.5	0.6	0.4	0.3	0.4	0.6	0.8	1.3	1.9	2.7	3.7	5.0	3.4	3.7	91.3	1.8	0.9	0.7
March Consensus	0.5	3.6	0.7	0.5	0.4	0.6	0.7	1.0	1.6	2.1	2.9	4.1	5.4	3.5	3.9	94.4	2.5	1.8	1.9
Number of Forecasts Changed From A Month Ago:																			
Down	17	14	16	14	17	16	14	16	17	16	18	17	14	8	14	17	24	9	15
Same	20	18	14	8	17	10	7	16	16	16	12	7	6	5	10	3	15	22	15
Up	9	7	9	6	7	10	15	13	12	14	12	5	8	9	13	4	7	12	16
Diffusion Index	41 %	41 %	41 %	36 %	38 %	42 %	51 %	47 %	44 %	48 %	43 %	29 %	39 %	52 %	49 %	23 %	32 %	53 %	51 %

Third Quarter 2016

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	1 Federal Funds Rate	2 Prime Bank Rate	3 LIBOR Rate 3-Mo.	4 Com. Paper 1-Mo.	5 Treas. Bills 3-Mo.	6 Treas. Bills 6-Mo.	7 Treas. Bills 1-Yr.	8 Treas. Notes 2-Yr.	9 Treas. Notes 5-Yr.	10 Treas. Notes 10-Yr.	11 Treas. Bond 30-Yr.	12 Aaa Corp. Bond	13 Baa Corp. Bond	14 State & Local Bonds	15 Home Mtg. Rate	A. Fed's Major Currency $ Index	B. Real GDP	C. GDP Price Index	D. Cons. Price Index
	Percent Per Annum -- Average For Quarter															Avg. For ---Qtr.---	(Q-Q % Change) (SAAR)		
	Short-Term							Intermediate-Term			Long-Term								
Cycledata Corp.	0.9 H	4.0 H	1.0	0.7	0.6	0.8	0.8	1.1	1.7	2.2	2.9	4.2	5.4	3.6	4.0	93.0	2.1	2.0	2.2
RBC	0.9 H	na	na	na	0.5	na	na	1.3	1.8	2.2	3.0	na	na	na	na	na	2.7	2.3	2.7
Amherst Pierpont Securities	0.8	4.0 H	1.3 H	0.9 H	0.9	1.2 H	1.7 H	1.7	2.4 H	2.8 H	3.6 H	4.7 H	6.1 H	4.2 H	4.7 H	95.0	2.6	1.9	2.8
SunTrust Banks	0.8	3.8	0.9	0.6	0.7	0.8	0.9	1.1	1.6	2.0	2.7	4.2	5.6	4.0	4.1	na	2.6	1.6	1.5
DePrince & Associates	0.8	3.8	1.1	0.9	0.7	0.9	1.2	1.5	1.8	2.4	3.0	4.1	5.1	3.9	4.2	93.6	2.7	1.8	2.2
Scotiabank Group	0.8	na	na	na	1.0 H	na	na	1.8 H	2.2	2.4	3.1	na	na	na	na	na	2.8	2.0	1.4
Goldman Sachs & Co.	0.8	na	1.0	na	0.7	na	na	1.2	2.1	2.4	3.2	na	na	na	4.5	na	2.3	1.9	2.2
High Frequency Economics	0.8	3.9	na	na	0.7	0.9	1.1	1.2	1.8	2.5	3.3	na	na	na	na	na	2.5	2.4	2.4
GLC Financial Economics	0.7	3.7	0.9	0.7	0.6	0.7	0.8	1.0	1.7	2.3	3.0	4.6	5.9	3.9	4.0	92.0	3.4 H	1.9	2.7
Stone Harbor Investment Partners	0.7	3.8	0.9	0.7	0.6	0.7	0.9	1.3	1.8	2.3	3.0	3.8	4.5 L	na	3.7 L	96.0	2.9	1.6	2.0
Chase Wealth Management	0.7	3.8	0.8	0.8	0.7	0.8	1.1	1.3	1.7	2.3	3.1	4.1	5.4	3.8	4.1	90.3	2.2	1.9	2.1
RDQ Economics	0.7	3.7	0.9	0.8	0.7	1.0	1.1	1.2	1.8	2.3	2.9	3.9	5.3	3.5	3.9	96.3	2.1	2.1	2.3
Nat'l Assn. of Realtors	0.7	3.8	0.9	0.8	0.7	0.8	1.0	1.3	1.9	2.3	3.1	4.2	5.5	3.8	4.2	na	2.2	1.8	2.4
Moody's Analytics	0.7	3.8	0.9	0.6	0.4 L	0.5	0.7 L	1.0	1.7	2.5	3.3	4.2	5.6	na	4.1	na	3.3	1.4	2.8
Economist Intelligence Unit	0.7	3.7	0.8	0.7	0.5	0.7	0.8	1.1	1.6	2.2	3.0	na	na	na	4.0	na	3.0	na	1.5
Regions Financial Corporation	0.7	3.8	0.9	0.7	0.6	0.8	0.9	1.2	1.7	2.2	3.1	4.1	5.3	na	4.0	92.6	2.4	1.6	2.6
Woodworth Holdings	0.7	3.8	0.9	0.6	0.6	0.7	0.9	1.3	1.8	2.3	3.1	4.2	5.5	3.7	4.1	92.5	2.5	0.6 L	0.8 L
MUFG Union Bank	0.7	3.8	0.9	0.7	0.6	0.8	0.9	1.3	1.8	2.3	3.0	3.8	5.2	3.5	4.1	93.0	2.8	1.8	3.0
The Northern Trust Company	0.6	3.8	0.8	0.6	0.5	0.7	0.8	1.1	1.9	2.3	3.1	3.9	5.2	3.6	3.9	na	2.6	1.1	1.2
MacroFin Analytics	0.6	3.8	0.9	0.7	0.6	0.7	0.9	1.1	1.7	2.1	3.0	4.1	5.4	3.6	4.0	92.3	2.4	1.7	1.7
Moody's Capital Markets Group	0.6	3.8	0.9	0.7	0.6	0.8	0.9	0.9	1.6	2.2	3.0	4.0	5.2	3.6	3.9	91.8	2.3	1.8	1.7
Nomura Securities, Inc.	0.6	3.6	0.9	0.9 H	na	na	na	1.0	1.5	2.0	2.6 L	4.2	5.5	na	3.9	na	2.3	1.6	1.9
Georgia State University	0.6	3.8	na	na	0.6	0.6	0.7 L	0.9	1.7	2.5	3.2	4.3	5.3	na	4.2	na	2.4	1.8	1.9
Bank of America Merrill Lynch	0.6	na	0.8	na	0.4 L	na	na	1.0	1.5	2.0	2.9	na	na	na	na	na	2.3	1.8	2.1
Daiwa Capital Markets America	0.6	3.8	0.9	0.7	0.6	0.7	0.8	1.1	1.6	2.1	2.8	4.0	5.1	3.4 L	3.9	93.0	2.4	1.8	2.1
Swiss Re	0.6	3.6	0.7	0.4 L	0.4 L	0.4 L	0.7 L	1.0	1.7	2.4	3.3	4.2	5.2	na	4.2	na	2.5	1.2	2.2
J.P. Morgan Chase	0.6	na	0.8	na	na	na	na	1.0	1.6	2.0	2.8	na	na	na	na	na	2.3	1.9	2.2
Naroff Economic Advisors	0.6	3.8	1.0	0.7	0.7	0.9	1.1	1.5	2.0	2.5	3.2	4.1	5.4	3.7	4.2	90.6	3.1	2.0	2.4
BMO Capital Markets	0.6	3.8	0.9	na	0.6	0.7	0.9	1.1	1.6	2.2	2.9	na	na	na	4.0	96.2	2.5	2.1	2.4
Fannie Mae	0.6	3.8	na	na	0.7	0.8	0.9	1.1	1.6	2.0	2.8	na	na	na	3.8	na	1.9	2.0	2.6
Loomis, Sayles & Company	0.6	3.6	0.8	0.7	0.6	0.8	0.9	1.3	1.8	2.4	2.9	4.2	5.5	3.5	4.0	92.7	2.0	2.5	3.0
Comerica Bank	0.6	3.6	0.9	na	0.5	0.7	0.9	1.1	1.6	2.1	2.9	na	na	na	3.8	na	2.2	1.6	3.2 H
Standard & Poor's Corp.	0.6	3.9	1.0	na	0.6	0.7	1.1	1.3	1.9	2.4	3.2	3.5 L	5.2	na	4.3	94.6	3.2	1.8	0.8
Barclays Capital	0.6	3.8	1.0	na	na	na	na	1.2	1.6	2.0	2.8	na	na	na	na	na	2.5	2.6 H	2.7
Wells Capital Management	0.6	3.8	0.8	0.6	0.6	0.8	1.1	1.2	1.7	2.2	3.0	4.3	5.6	4.0	4.0	95.3	2.5	1.7	1.2
RidgeWorth Investments	0.6	3.8	1.0	0.7	0.5	0.6	0.8	1.2	1.9	2.5	3.2	4.3	5.7	3.7	4.3	94.0	2.5	2.0	1.8
Chmura Economics & Analytics	0.6	3.8	0.9	0.7	0.5	0.7	0.9	1.2	1.9	2.3	3.2	4.2	na	na	4.2	87.4 L	3.2	1.7	2.0
PNC Financial Services Corp.	0.6	3.8	0.9	na	0.6	0.6	0.8	1.2	1.7	2.3	2.9	na	5.5	3.7	4.0	94.2	2.3	1.5	1.8
RBS Securities	0.6	3.7	0.9	0.6	0.6	0.8	0.9	1.5	1.9	2.4	3.1	4.2	5.4	3.8	4.1	95.0	2.6	2.1	2.4
Wells Fargo	0.6	3.8	0.8	0.7	0.8	0.9	1.0	1.1	1.6	2.0	2.8	3.9	5.2	3.5	3.9	93.5	2.4	2.3	2.6
DS Economics	0.6	3.8	0.8	0.6	0.5	0.7	0.9	1.1	1.6	2.2	3.0	4.0	5.4	3.8	4.0	91.0	1.9	2.2	2.8
UBS AG	0.5	na	0.9	na	0.6	na	na	na	na	1.9	na	na	na	na	na	na	2.0	2.3	3.0
Action Economics	0.5	3.6	0.7	0.5	0.5	0.6	0.8	1.1	1.6	2.1	2.8	4.0	5.6	3.5	3.9	na	2.2	1.0	1.9
Oxford Economics	0.4 L	3.7	na	na	0.4 L	0.5	0.8	1.1	1.6	2.1	na	na	na	na	4.1	96.7 H	2.1	2.0	1.2
Societe Generale	0.4 L	3.4 L	0.6 L	na	na	na	na	0.6 L	1.1 L	1.6 L	3.0	na	na	na	na	na	2.1	2.0	1.7
BNP Paribas Americas	0.4 L	na	0.7	na	na	na	na	0.8	1.2	1.7	na	na	na	na	na	na	1.6 L	na	2.3
April Consensus	**0.6**	**3.7**	**0.9**	**0.7**	**0.6**	**0.7**	**0.9**	**1.2**	**1.7**	**2.2**	**3.0**	**4.1**	**5.4**	**3.7**	**4.0**	**93.3**	**2.5**	**1.8**	**2.1**
Top 10 Avg.	0.8	3.9	1.0	0.8	0.8	0.9	1.1	1.4	2.0	2.5	3.3	4.3	5.7	3.9	4.3	95.3	3.0	2.3	2.9
Bottom 10 Avg.	0.5	3.6	0.7	0.6	0.4	0.6	0.8	0.9	1.5	1.9	2.8	3.9	5.1	3.5	3.8	91.3	2.0	1.3	1.3
March Consensus	0.7	3.8	1.0	0.8	0.7	0.8	1.0	1.2	1.8	2.3	3.1	4.3	5.5	3.8	4.1	94.8	2.5	1.9	2.2
Number of Forecasts Changed From A Month Ago:																			
Down	18	14	20	17	18	20	22	19	20	21	19	17	15	8	17	17	17	12	13
Same	24	22	14	11	18	10	7	15	18	16	16	9	9	8	11	4	23	22	19
Up	4	4	7	3	6	7	8	11	7	9	7	5	7	9	11	7	6	9	14
Diffusion Index	35 %	38 %	34 %	27 %	36 %	32 %	31 %	41 %	36 %	37 %	36 %	31 %	37 %	52 %	42 %	32 %	38 %	47 %	51 %

Fourth Quarter 2016

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	Percent Per Annum -- Average For Quarter: Short-Term							Intermediate-Term			Long-Term					Avg. For Qtr.	(Q-Q % Change) (SAAR)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	A.	B.	C.	D.
	Federal Funds Rate	Prime Bank Rate	LIBOR Rate 3-Mo.	Com. Paper 1-Mo.	Treas. Bills 3-Mo.	Treas. Bills 6-Mo.	Treas. Bills 1-Yr.	Treas. Notes 2-Yr.	Treas. Notes 5-Yr.	Treas. Notes 10-Yr.	Treas. Bond 30-Yr.	Aaa Corp. Bond	Baa Corp. Bond	State & Local Bonds	Home Mtg. Rate	Fed's Major Currency $ Index	Real GDP	GDP Price Index	Cons. Price Index
Amherst Pierpont Securities	1.2 H	4.3 H	1.7 H	1.3 H	1.3	1.6 H	2.0 H	2.2 H	2.8 H	3.2 H	4.1 H	5.1 H	6.5 H	4.5 H	5.1 H	96.5	2.6	2.1	3.0
DePrince & Assoc.	1.1	4.1	1.4	1.2	1.1	1.3	1.6	2.0	2.2	2.7	3.3	4.4	5.4	4.2	4.5	93.3	2.6	2.2	2.4
RBC	1.1	na	na	na	0.7	na	na	1.6	2.2	2.6	3.3	na	na	na	na	na	3.0	1.6	1.3
Scotiabank Group	1.0	na	na	na	1.4 H	na	na	2.1	2.4	2.5	3.2	na	na	na	na	na	2.8	2.0	2.2
Goldman Sachs & Co.	1.0	na	1.3	na	0.9	na	na	1.3	2.2	2.6	3.2	na	na	na	4.6	na	2.3	2.0	2.5
High Frequency Economics	1.0	4.1	na	na	1.0	1.1	1.4	1.6	2.1	2.6	3.4	na	na	na	na	na	2.5	2.5	2.5
GLC Financial Economics	1.0	4.0	1.2	1.1	0.9	1.0	1.1	1.3	2.0	2.6	3.3	4.9	6.1	4.2	4.5	91.6	2.8	2.0	2.7
Naroff Economic Advisors	1.0	4.0	1.3	1.1	1.1	1.3	1.4	1.7	2.3	2.8	3.3	4.4	5.5	4.0	4.4	90.0	2.6	2.6 H	2.7
SunTrust Banks	1.0	4.0	1.1	0.8	0.9	0.9	1.0	1.2	1.6	2.1	2.8 L	4.4	5.9	3.9	4.4	na	2.3	1.7	1.8
Stone Harbor Investment Partners	0.9	4.0	1.1	0.9	0.8	0.9	1.1	1.5	2.0	2.4	3.1	4.0	4.7 L	na	3.9	97.0	2.8	1.5	2.2
Cycledata Corp.	0.9	4.0	1.0	0.8	0.7	0.8	0.9	1.2	1.8	2.3	2.9	4.2	5.4	3.7	4.0	93.0	2.0	2.0	2.2
Chase Wealth Management	0.9	4.0	1.0	1.0	0.9	1.0	1.3	1.5	1.9	2.5	3.3	4.3	5.6	4.0	4.3	90.3	2.3	2.0	2.2
Nat'l Assn. of Realtors	0.9	4.0	1.2	1.0	0.9	1.0	1.2	1.5	2.2	2.5	3.3	4.4	5.7	4.0	4.4	na	2.4	1.8	2.5
MUFG Union Bank	0.9	4.0	1.1	1.0	0.8	1.0	1.2	1.7	2.0	2.5	3.1	4.1	5.4	3.6	4.3	95.0	2.7	1.8	2.5
RDQ Economics	0.9	3.9	1.1	1.0	0.9	1.2	1.4	1.5	2.0	2.5	3.0	4.0	5.3	3.6	4.1	98.0 H	2.0	2.2	2.5
Swiss Re	0.9	3.9	1.0	0.7	0.6	0.7	1.1	1.4	1.9	2.5	3.5	4.3	5.3	na	4.3	na	2.7	0.9	1.9
MacroFin Analytics	0.9	4.0	1.2	0.9	0.8	1.0	1.1	1.4	2.0	2.4	3.3	4.4	5.6	3.9	4.2	93.0	2.5	1.8	1.9
Nomura Securities, Inc.	0.9	3.9	1.1	1.1	na	na	na	1.3	1.8	2.3	2.9	4.5	5.9	na	4.2	na	2.3	1.5	2.2
J.P. Morgan Chase	0.9	na	1.1	na	na	na	na	1.2	1.7	2.1	2.8 L	na	na	na	na	na	2.3	2.0	2.3
Regions Financial Corporation	0.9	4.0	1.0	0.9	0.8	1.0	1.1	1.3	1.8	2.4	3.2	4.1	5.4	na	4.1	93.1	2.2	1.9	2.8
Barclays Capital	0.9	4.0	1.2	na	na	na	na	1.3	1.7	2.0	2.8 L	na	na	na	na	na	2.5	2.3	2.2
Bank of America Merrill Lynch	0.9	na	0.8	na	0.5 L	na	na	1.0	1.5	2.0	2.9	na	na	na	na	na	2.2	1.9	2.8
Chmura Economics & Analytics	0.9	4.0	1.1	0.9	0.8	1.0	1.2	1.5	2.3	2.7	3.6	4.5	na	na	4.5	85.7 L	3.2 H	1.8	1.9
Moody's Analytics	0.9	4.0	1.1	0.8	0.5 L	0.6 L	0.9	1.3	2.0	2.8	3.6	4.4	5.9	na	4.4	na	3.0	1.7	3.1
Daiwa Capital Markets America	0.8	3.9	1.0	0.8	0.7	0.9	1.0	1.2	1.7	2.2	2.9	4.1	5.1	3.5 L	4.0	93.0	2.4	1.8	2.3
Economist Intelligence Unit	0.8	3.8	1.1	0.8	0.8	0.9	1.0	1.3	1.8	2.4	3.2	na	na	na	4.2	na	2.3	na	2.3
Wells Capital Management	0.8	3.9	1.0	0.8	0.8	1.0	1.4	1.5	1.8	2.3	3.2	4.5	5.8	4.2	4.1	95.7	2.4	1.9	1.5
UBS AG	0.8	na	1.3	na	1.0	na	na	na	na	2.0	na	na	na	na	na	na	2.0	2.3	1.8
Loomis, Sayles & Company	0.8	3.8	0.9	0.8	0.7	0.9	1.1	1.5	2.0	2.5	3.0	4.2	5.5	3.5 L	4.2	92.7	2.0	2.4	2.5
Action Economics	0.7	3.8	0.9	0.8	0.7	0.8	1.0	1.2	1.7	2.2	2.9	4.1	5.6	3.5 L	4.0	na	2.4	1.3	1.9
BMO Capital Markets	0.7	3.8	1.0	na	0.6	0.8	1.0	1.2	1.7	2.2	3.0	na	na	na	4.1	96.8	2.4	2.0	2.4
Standard & Poor's Corp.	0.7	3.9	1.1	na	0.7	0.8	1.1	1.4	2.0	2.5	3.3	3.7 L	5.2	na	4.4	94.9	2.7	1.6	4.5 H
RidgeWorth Investments	0.7	3.8	1.1	0.8	0.6	0.7	0.9	1.3	2.0	2.6	3.3	4.3	5.7	3.5 L	4.4	93.0	2.5	2.0	1.8
Wells Fargo	0.7	3.8	0.8	0.8	0.9	1.0	1.1	1.2	1.7	2.1	2.8 L	4.0	5.3	3.6	4.0	95.5	2.3	2.2	2.4
The Northern Trust Company	0.7	3.8	0.9	0.7	0.6	0.8	1.0	1.3	2.1	2.6	3.4	4.1	5.2	3.9	4.2	na	2.5	1.7	1.8
Georgia State University	0.7	3.8	na	na	0.6	0.6 L	0.7 L	1.0	1.7	2.5	3.2	4.3	5.4	na	4.4	na	2.5	1.8	2.3
Oxford Economics	0.7	3.8	na	na	0.6	0.7	1.0	1.2	1.7	2.2	na	na	na	na	4.2	97.4	2.3	1.9	1.5
Fannie Mae	0.7	3.8	na	na	0.8	0.9	1.0	1.2	1.7	2.1	2.9	na	na	na	3.8	na	2.0	1.7	1.9
Moody's Capital Markets Group	0.7	3.8	1.0	0.8	0.7	0.9	1.0	1.1	1.8	2.4	3.0	4.0	5.3	3.7	4.1	93.0	2.4	1.7	2.0
DS Economics	0.7	3.8	0.9	0.7	0.6	0.9	1.1	1.4	1.8	2.4	3.2	4.0	5.4	3.9	4.2	92.0	2.2	2.1	2.4
Comerica Bank	0.7	3.7	0.9	na	0.5 L	0.7	0.9	1.1	1.5	2.0	2.9	na	na	na	3.7 L	na	2.4	2.0	3.1
Woodworth Holdings	0.7	3.8	0.9	0.6 L	0.6	0.7	0.9	1.3	1.8	2.3	3.1	4.2	5.5	3.7	4.1	92.5	2.5	0.8 L	0.9 L
PNC Financial Services Corp.	0.7	3.8	1.0	na	0.8	0.8	0.9	1.3	1.8	2.3	2.9	na	5.4	3.6	4.0	93.7	2.3	1.7	2.0
RBS Securities	0.7	3.8	1.1	0.7	0.7	0.8	1.0	1.7	2.1	2.6	3.2	4.4	5.6	3.9	4.4	96.0	2.7	1.9	2.3
Societe Generale	0.5	3.5 L	0.8	na	na	na	na	1.0	1.5	2.0	3.0	na	na	na	na	na	2.2	2.5	3.9
BNP Paribas Americas	0.4 L	na	0.7 L	na	na	na	na	0.8 L	1.1 L	1.5 L	na	na	na	na	na	na	1.5 L	na	2.0
April Consensus	**0.8**	**3.9**	**1.0**	**0.9**	**0.8**	**0.9**	**1.1**	**1.4**	**1.9**	**2.4**	**3.1**	**4.3**	**5.5**	**3.8**	**4.2**	**93.7**	**2.4**	**1.9**	**2.3**
Top 10 Avg.	1.0	4.1	1.3	1.1	1.0	1.2	1.4	1.8	2.3	2.7	3.5	4.6	5.9	4.1	4.5	96.3	2.8	2.3	3.1
Bottom 10 Avg.	0.6	3.7	0.8	0.7	0.6	0.7	0.9	1.1	1.6	2.0	2.8	4.0	5.2	3.6	3.9	91.4	2.0	1.4	1.6
March Consensus	0.9	4.0	1.1	1.0	0.9	1.0	1.2	1.4	2.0	2.5	3.2	4.4	5.6	3.9	4.3	94.8	2.4	1.9	2.3
Number of Forecasts Changed From A Month Ago:																			
Down	19	16	20	17	17	18	18	18	19	18	16	17	13	8	16	16	13	9	8
Same	22	19	16	10	17	10	8	17	18	19	17	9	6	5	13	5	26	26	26
Up	5	4	4	2	7	8	10	10	8	9	9	3	4	6	8	4	7	8	12
Diffusion Index	35 %	35 %	30 %	24 %	38 %	36 %	39 %	41 %	38 %	40 %	42 %	26 %	30 %	45 %	39 %	26 %	43 %	49 %	54 %

First Quarter 2017

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	Percent Per Annum -- Average For Quarter: Short-Term: 1 Federal Funds Rate	2 Prime Bank Rate	3 LIBOR Rate 3-Mo.	4 Com. Paper 1-Mo.	5 Treas. Bills 3-Mo.	6 Treas. Bills 6-Mo.	7 Treas. Bills 1-Yr.	Intermediate-Term: 8 Treas. Notes 2-Yr.	9 Treas. Notes 5-Yr.	10 Treas. Notes 10-Yr.	Long-Term: 11 Treas. Bond 30-Yr.	12 Aaa Corp. Bond	13 Baa Corp. Bond	14 State & Local Bonds	15 Home Mtg. Rate	Avg. For Qtr.: A. Fed's Major Currency $ Index	(Q-Q % Change) (SAAR): B. Real GDP	C. GDP Price Index	D. Cons. Price Index
Amherst Pierpont Securities	1.6 H	4.7 H	2.0 H	1.7 H	1.7 H	2.0 H	2.4 H	2.6 H	3.1 H	3.6 H	4.4 H	5.5 H	6.9 H	4.8 H	5.4 H	97.5	2.3	2.3	3.1
Naroff Economic Advisors	1.5	4.5	1.9	1.6	1.7 H	1.8	2.0	2.3	2.8	3.3	3.7	4.5	5.6	4.1	4.8	89.2	2.2	2.4	2.9
RDQ Economics	1.4	4.4	1.7	1.5	1.5	1.7	1.9	2.0	2.5	2.9	3.4	4.4	5.5	4.1	4.5	98.8 H	1.9	2.2	2.5
DePrince & Associates	1.4	4.4	1.7	1.5	1.4	1.6	1.9	2.3	2.5	3.0	3.5	4.7	5.7	4.4	4.8	93.4	2.7	2.3	2.6
RBC	1.4	na	na	na	1.0	na	na	1.9	2.4	2.8	3.5	na	na	na	na	na	2.8	2.2	1.0 L
GLC Financial Economics	1.3	4.3	1.6	1.4	1.3	1.3	1.4	1.6	2.4	3.0	3.6	5.1	6.4	4.5	4.9	91.9	2.9	1.4	2.9
Moody's Analytics	1.3	4.4	1.6	1.2	0.8	0.9 L	1.4	1.7	2.7	3.3	4.0	4.9	6.5	na	4.8	na	3.2	2.0	3.1
Scotiabank Group	1.3	na	na	na	1.7 H	na	na	2.3	2.6	2.8	3.4	na	na	na	na	na	2.8	2.0	2.4
Goldman Sachs	1.3	na	1.5	na	1.2	na	na	1.6	2.4	2.8	3.3	na	na	na	4.7	na	2.3	2.1	2.6
High Frequency Economics	1.3	4.4	na	na	1.3	1.4	1.8	2.0	2.3	2.7	3.4	na	na	na	na	na	2.3	2.6	2.6
Swiss Re	1.3	4.3	1.3	1.1	1.0	1.1	1.5	1.8	2.0	2.6	3.5	4.4	5.3	na	4.4	na	2.4	3.3 H	3.3 H
MacroFin Analytics	1.2	4.4	1.5	1.3	1.2	1.3	1.5	1.7	2.3	2.7	3.6	4.7	6.0	4.2	4.6	94.4	2.2	1.9	2.0
MUFG Union Bank	1.2	4.3	1.4	1.2	1.1	1.3	1.5	1.9	2.2	2.7	3.2	4.3	5.6	3.7	4.5	94.0	2.5	2.2	2.6
J.P. Morgan Chase	1.1	na	1.3	na	na	na	na	1.4	1.9	2.2	2.9	na	na	na	na	na	2.0	2.0	2.4
Barclays Capital	1.1	4.3	1.2	na	na	na	na	1.4	1.7	2.0	2.8 L	na	na	na	na	na	2.5	2.3	2.2
Stone Harbor Investment Partners	1.1	4.3	1.3	1.1	1.0	1.1	1.3	1.6	2.1	2.6	3.2	4.1	4.8 L	na	4.0	98.0	2.4	1.8	2.0
SunTrust Banks	1.1	4.1	1.6	1.2	1.0	1.0	1.1	1.3	1.7	2.1	2.8 L	4.9	6.5	3.9	4.8	na	3.3 H	1.8	2.0
Economist Intelligence Unit	1.1	4.1	1.3	1.1	1.1	1.2	1.2	1.6	2.0	2.6	3.4	na	na	na	4.5	na	2.0	na	2.2
Nat'l Assn. of Realtors	1.1	4.2	1.4	1.4	1.2	1.4	1.5	1.7	2.4	2.6	3.5	4.6	5.8	4.2	4.5	na	2.3	1.9	2.3
Wells Capital Management	1.0	4.2	1.1	1.0	1.0	1.2	1.5	1.7	1.9	2.4	3.1	4.5	5.8	4.3	4.2	95.9	2.6	1.6	1.8
UBS AG	1.0	na	1.5	na	1.2	na	na	na	na	2.0	na	na	na	na	na	na	2.9	2.3	2.2
Daiwa Capital Markets America	1.0	4.2	1.3	1.1	1.0	1.1	1.2	1.5	1.9	2.3	3.0	4.3	5.2	3.6	4.1	94.0	2.3	1.9	2.3
Cycledata Corp.	1.0	4.3	1.2	0.9 L	0.8	0.9 L	1.0	1.3	1.9	2.4	3.0	4.3	5.5	3.7	4.1	93.0	2.0	2.1	2.4
Chmura Economics & Analytics	1.0	4.0	1.2	1.0	0.8	1.1	1.3	1.6	2.5	2.9	3.8	4.6	na	na	4.7	83.5 L	2.9	1.9	2.1
Standard & Poor's Corp.	1.0	4.0	1.3	na	0.9	1.1	1.3	1.6	2.2	2.7	3.4	3.9 L	5.3	na	4.6	94.8	2.6	1.8	2.0
Regions Financial Corporation	0.9	4.1	1.1	1.1	0.9	1.2	1.3	1.5	2.0	2.6	3.4	4.3	5.5	na	4.3	92.6	2.0	1.9	2.3
The Northern Trust Company	0.9	4.1	1.1	0.9 L	0.8	1.0	1.2	1.6	2.3	2.8	3.6	4.3	5.4	4.1	4.4	na	2.5	1.7	1.8
Oxford Economics	0.9	3.9	na	na	0.9	1.0	1.2	1.5	1.9	2.4	na	na	na	na	4.3	97.0	2.5	2.0	1.8
Moody's Capital Markets Group	0.9	4.1	1.2	1.0	1.0	1.2	1.3	1.5	1.9	2.3	2.9	4.0	5.2	3.6	4.0	92.8	2.1	1.9	1.9
Fannie Mae	0.9	4.0	na	na	0.9	1.0	1.1	1.3	1.8	2.1	2.9	na	na	na	3.9 L	na	2.1	1.9	2.6
Comerica Bank	0.9	3.9	1.2	na	0.8	0.9 L	1.1	1.4	1.8	2.2	3.1	na	na	na	4.0	na	2.7	2.2	2.8
Woodworth Holdings	0.9	4.0	1.1	0.9 L	0.9	1.0	1.2	1.5	2.1	2.7	3.4	4.6	5.8	4.0	4.5	93.0	2.5	1.0 L	1.2
Wells Fargo	0.9	4.0	1.0	1.0	1.1	1.2	1.3	1.4	1.8	2.2	2.9	4.1	5.4	3.6	4.1	97.0	2.2	1.8	2.1
RBS Securities	0.9	4.0	1.3	0.9 L	0.9	1.1	1.3	2.0	2.4	2.8	3.3	4.6	5.8	4.0	4.6	96.0	2.5	1.6	2.2
PNC Financial Services Corp.	0.9	4.1	1.2	na	0.9	0.9 L	1.1	1.5	1.9	2.3	2.9	na	5.4	3.5 L	4.0	93.7	2.2	2.0	2.2
Chase Wealth Management	0.9	4.0	1.0	1.0	0.9	1.0	1.3	1.5	1.9	2.5	3.3	4.3	5.6	4.0	4.3	90.4	2.1	2.1	2.2
DS Economics	0.9	4.0	1.1	0.9 L	0.8	1.1	1.4	1.6	2.1	2.6	3.4	4.1	5.4	4.2	4.3	92.0	2.1	2.2	2.2
Action Economics	0.9	4.0	1.0	0.9 L	0.9	1.0	1.1	1.4	1.8	2.3	3.0	4.1	5.6	3.5 L	4.0	na	2.5	1.4	2.0
BMO Capital Markets	0.9	4.0	1.1	na	0.8	1.0	1.1	1.3	1.8	2.4	3.0	na	na	na	4.2	96.1	2.3	2.4	2.7
Loomis, Sayles & Company	0.9	3.9	1.0	0.9 L	0.8	1.0	1.2	1.5	2.0	2.5	3.0	4.2	5.4	3.5 L	4.2	92.7	2.0	2.6	2.7
Nomura Securities, Inc.	0.9	3.9	1.2	1.2	na	na	na	1.3	1.8	2.5	3.1	4.8	6.1	na	4.5	na	2.1	1.5	2.8
RidgeWorth Investments	0.9	4.0	1.2	0.9 L	0.7 L	0.9 L	1.1	1.5	2.2	2.7	3.5	4.4	5.8	3.5 L	4.5	92.0	2.5	2.0	2.2
Georgia State University	0.9	3.9	na	na	0.8	0.9 L	0.9 L	1.1	1.9	2.7	3.3	4.5	5.5	na	4.5	na	2.3	1.7	2.5
Societe Generale	0.8	3.8 L	1.1	na	na	na	na	1.2	1.8	2.2	3.1	na	na	na	na	na	2.3	2.2	2.7
BNP Paribas Americas	0.4 L	na	0.9 L	na	na	na	na	1.0 L	1.3 L	1.6 L	na	na	na	na	na	na	1.4 L	na	1.6
April Consensus	**1.0**	**4.1**	**1.3**	**1.1**	**1.0**	**1.2**	**1.3**	**1.6**	**2.1**	**2.6**	**3.3**	**4.5**	**5.7**	**3.9**	**4.4**	**93.7**	**2.4**	**2.0**	**2.3**
Top 10 Avg.	1.4	4.4	1.7	1.4	1.4	1.5	1.7	2.1	2.6	3.0	3.7	4.8	6.1	4.3	4.8	96.6	2.9	2.5	2.9
Bottom 10 Avg.	0.8	3.9	1.0	0.9	0.8	0.9	1.1	1.2	1.7	2.1	2.9	4.1	5.3	3.6	4.0	91.0	2.0	1.6	1.7
March Consensus	1.2	4.2	1.4	1.3	1.1	1.2	1.4	1.7	2.2	2.7	3.4	4.6	5.7	4.0	4.5	94.5	2.4	2.0	2.3
Number of Forecasts Changed From A Month Ago:																			
Down	20	16	19	17	17	19	19	16	18	17	16	18	15	9	17	14	12	12	12
Same	22	20	16	10	18	11	8	17	15	18	15	9	10	8	12	7	27	29	25
Up	4	4	3	2	6	7	10	10	10	9	10	2	4	6	9	6	7	2	9
Diffusion Index	33 %	35 %	29 %	24 %	37 %	34 %	38 %	43 %	41 %	41 %	43 %	22 %	31 %	43 %	39 %	35 %	45 %	38 %	47 %

Second Quarter 2017

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	Percent Per Annum -- Average For Quarter: Short-Term							Intermediate-Term			Long-Term					Avg. For Qtr.	(Q-Q % Change) (SAAR)		
	1 Federal Funds Rate	2 Prime Bank Rate	3 LIBOR Rate 3-Mo.	4 Com. Paper 1-Mo.	5 Treas. Bills 3-Mo.	6 Treas. Bills 6-Mo.	7 Treas. Bills 1-Yr.	8 Treas. Notes 2-Yr.	9 Treas. Notes 5-Yr.	10 Treas. Notes 10-Yr.	11 Treas. Bond 30-Yr.	12 Aaa Corp. Bond	13 Baa Corp. Bond	14 State & Local Bonds	15 Home Mtg. Rate	A. Fed's Major Currency $ Index	B. Real GDP	C. GDP Price Index	D. Cons. Price Index
Amherst Pierpont Securities	2.1 H	5.2 H	2.5 H	2.1 H	2.1	2.4 H	2.8 H	3.0 H	3.4 H	3.9 H	4.7 H	5.7 H	7.2 H	5.1 H	5.7 H	87.0	2.6	2.2	3.2
Naroff Economic Advisors	2.0	5.0	2.4	2.1 H	2.2 H	2.3	2.5	2.8	3.4 H	3.8	4.2	4.8	5.8	4.2	5.3	88.5	2.6	2.6	3.1
Moody's Analytics	1.8	4.9	2.0	1.7	1.3	1.4	1.9	2.0	2.9	3.6	4.2	5.1	6.7	na	5.2	na	3.1 H	2.2	3.1
RDQ Economics	1.7	4.7	2.0	1.8	1.8	2.0	2.2	2.3	2.8	3.2	3.6	4.7	5.7	4.3	4.8	99.7 H	1.9	2.3	2.7
GLC Financial Economics	1.7	4.7	1.9	1.7	1.6	1.7	1.7	2.0	2.8	3.4	4.0	5.4	6.6	4.8	5.5	92.3	2.5	2.2	2.8
DePrince & Assoc.	1.6	4.6	2.0	1.8	1.6	1.8	2.2	2.6	2.8	3.3	3.7	5.1	6.0	4.7	5.1	93.6	2.7	2.3	2.5
High Frequency Economics	1.6	4.8	na	na	1.7	1.8	2.0	2.1	2.4	2.8	3.5	na	na	na	na	na	2.3	2.7	2.7
Swiss Re	1.6	4.6	1.7	1.4	1.4	1.5	1.8	2.1	2.2	2.7	3.6	4.5	5.5	na	4.6	na	2.1	1.8	2.8
RBC	1.6	na	na	na	1.3	na	na	2.2	2.7	3.0	3.6	na	na	na	na	na	2.8	2.5	2.6
MacroFin Analytics	1.5	4.6	1.8	1.5	1.4	1.6	1.7	2.0	2.6	3.0	3.9	5.0	6.2	4.5	4.8	95.0	2.3	2.0	2.0
Goldman Sachs & Co.	1.5	na	1.8	na	1.4	na	na	1.9	2.6	2.9	3.3	na	na	na	4.8	na	2.3	1.9	2.2
Scotiabank Group	1.5	na	na	na	2.1	na	na	2.6	2.9	3.0	3.5	na	na	na	na	na	2.7	2.0	2.2
Comerica Bank	1.4	4.4	1.7	na	1.3	1.4	1.6	1.9	2.2	2.7	3.5	na	na	na	4.2	na	2.7	2.0	2.0
Nat'l Assn. of Realtors	1.4	4.4	1.7	1.6	1.4	1.6	1.8	2.0	2.6	2.8	3.7	4.8	5.9	4.4	4.7	na	2.3	2.0	2.2
Economist Intelligence Unit	1.4	4.4	1.6	1.3	1.4	1.5	1.4	1.9	2.2	2.8	3.6	na	na	na	4.7	na	2.6	na	2.2
MUFG Union Bank	1.4	4.5	1.6	1.5	1.4	1.6	1.8	2.1	2.4	2.8	3.3	4.5	5.9	3.8	4.6	93.0	2.5	2.5	3.8 H
J.P. Morgan Chase	1.4	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.0	2.0	2.4
Barclays Capital	1.4	4.5	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.5	3.0 H	3.4
Stone Harbor Investment Partners	1.4	4.5	1.5	1.4	1.3	1.4	1.5	1.8	2.3	2.7	3.3	4.2	4.9 L	na	4.1	96.0	2.5	2.4	1.8
Cycledata Corp.	1.3	4.5	1.5	1.2	1.1	1.2	1.3	1.6	2.2	2.7	3.1	4.4	5.6	3.9	4.4	93.0	2.0	2.1	2.4
Wells Capital Management	1.3	4.4	1.4	1.3	1.3	1.5	1.7	1.9	2.1	2.5	3.2	4.6	5.9	4.4	4.3	96.1	2.8	1.8	2.1
Chmura Economics & Analytics	1.3	4.3	1.5	1.3	1.1	1.4	1.6	2.0	2.9	3.3	4.2	4.9	na	na	5.0	81.4 L	3.1 H	2.0	2.2
UBS AG	1.3	na	1.8	na	1.5	na	na	na	na	2.1	na	na	na	na	na	na	2.9	2.3	3.8 H
SunTrust Banks	1.2	4.2	2.0	1.7	1.1	1.1	1.2	1.3	1.8	2.1	2.8 L	5.1	6.7	4.0	5.2	na	3.0	1.9	2.2
Standard & Poor's Corp.	1.2	4.1	1.6	na	1.2	1.4	1.6	1.8	2.3	2.8	3.5	4.1	5.3	na	4.7	94.3	1.5	2.1	1.4
Wells Fargo	1.2	4.3	1.3	1.3	1.3	1.4	1.5	1.6	1.9	2.3	2.9	4.2	5.5	3.7	4.2	98.5	2.3	1.9	2.1
Chase Wealth Management	1.2	4.3	1.3	1.3	1.2	1.3	1.6	1.8	2.2	2.8	3.6	4.6	5.9	4.3	4.6	90.4	2.3	2.0	2.2
Regions Financial Corporation	1.2	4.3	1.4	1.3	1.1	1.4	1.4	1.7	2.2	2.8	3.5	4.4	5.6	na	4.4	91.8	2.1	1.8	2.4
The Northern Trust Company	1.2	4.3	1.3	1.2	1.0 L	1.2	1.4	1.8	2.4	2.9	3.7	4.4	5.5	4.2	4.5	na	2.3	1.8	1.9
Moody's Capital Markets Group	1.2	4.3	1.4	1.3	1.2	1.3	1.4	1.5	1.9	2.3	2.8 L	3.9 L	5.1	3.4 L	4.0	92.6	2.3	2.0	1.8
Oxford Economics	1.2	4.0 L	na	na	1.1	1.3	1.4	1.6	2.0	2.5	na	na	na	na	4.5	96.5	2.3	2.2	2.0
Woodworth Holdings	1.2	4.3	1.4	1.1	1.1	1.2	1.4	1.8	2.4	2.9	3.6	4.8	6.1	4.2	4.7	93.5	2.5	1.2 L	1.3 L
Daiwa Capital Markets America	1.2	4.3	1.4	1.2	1.1	1.2	1.3	1.7	2.1	2.5	3.1	4.3	5.2	3.8	4.3	94.0	2.1	1.9	2.3
PNC Financial Services Corp.	1.2	4.3	1.4	na	1.2	1.2	1.3	1.7	2.0	2.5	3.0	na	5.4	3.5	4.1	93.6	2.2	2.0	2.3
RBS Securities	1.2	4.3	1.6	1.2	1.2	1.4	1.6	2.2	2.5	3.0	3.3	4.7	5.9	4.0	4.8	96.0	2.7	1.7	2.9
Action Economics	1.1	4.3	1.2	1.2	1.1	1.2	1.3	1.5	2.0	2.4	3.1	4.1	5.7	3.6	4.1	na	2.3	1.7	2.0
Fannie Mae	1.1	4.3	na	na	1.1	1.2	1.3	1.4	1.9	2.2	2.9	na	na	na	3.9 L	na	2.0	1.9	2.1
Nomura Securities, Inc.	1.1	4.1	1.4	1.4	na	na	na	1.3	1.8	2.3	2.9	4.5	5.9	na	4.2	na	2.0	1.5	2.3
RidgeWorth Investments	1.1	4.3	1.5	1.2	1.0 L	1.1	1.3	1.7	2.4	3.0	3.7	4.6	5.9	3.7	4.8	89.0	2.5	2.2	2.2
DS Economics	1.1	4.3	1.2	1.1 L	1.0 L	1.3	1.6	1.9	2.4	2.8	3.6	4.1	5.4	4.4	4.6	90.0	2.1	2.1	2.1
Societe Generale	1.0	4.0 L	1.3	na	na	na	na	1.3	1.9	2.4	3.1	na	na	na	na	na	2.3	2.1	2.1
Loomis, Sayles & Company	1.0	4.0 L	1.3	1.1 L	1.0 L	1.2	1.4	1.7	2.2	2.6	3.0	4.2	5.3	3.5	4.3	92.7	2.0	2.4	2.6
Georgia State University	1.0	4.0 L	na	na	1.0 L	1.0 L	1.0 L	1.3	2.1	2.9	3.5	4.7	5.8	na	4.7	na	2.5	2.1	2.7
BMO Capital Markets	1.0	4.1	1.2	na	1.1	1.0 L	1.2	1.5	2.0	2.5	3.1	na	na	na	4.3	95.1	2.2	2.2	2.5
BNP Paribas Americas	0.4 L	na	1.0 L	na	na	na	na	1.0 L	1.3 L	1.6 L	na	na	na	na	na	na	1.4 L	na	2.0
April Consensus	**1.3**	**4.4**	**1.6**	**1.4**	**1.3**	**1.4**	**1.6**	**1.8**	**2.3**	**2.8**	**3.5**	**4.6**	**5.8**	**4.1**	**4.6**	**92.9**	**2.4**	**2.1**	**2.4**
Top 10 Avg.	1.7	4.8	2.0	1.7	1.7	1.8	2.1	2.4	2.9	3.3	4.0	5.1	6.3	4.5	5.1	96.1	2.8	2.5	3.2
Bottom 10 Avg.	1.0	4.1	1.2	1.2	1.0	1.1	1.3	1.4	1.8	2.2	3.0	4.2	5.3	3.7	4.1	89.6	1.9	1.7	1.8
March Consensus	1.4	4.5	1.7	1.5	1.4	1.5	1.7	1.9	2.4	2.8	3.5	4.8	5.9	4.2	4.7	94.2	2.4	2.1	2.4
Number of Forecasts Changed From A Month Ago:																			
Down	21	17	19	18	17	21	21	17	18	17	16	15	16	9	18	14	12	13	13
Same	21	18	14	10	17	10	8	17	16	19	16	8	10	10	12	8	28	26	24
Up	4	5	5	2	7	6	8	9	9	8	8	6	4	4	8	5	6	4	9
Diffusion Index	32 %	35 %	32 %	23 %	38 %	30 %	32 %	41 %	40 %	40 %	40 %	34 %	30 %	39 %	37 %	33 %	43 %	40 %	46 %

Third Quarter 2017

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	---Percent Per Annum -- Average For Quarter--- ---Short-Term--- 1 Federal Funds Rate	2 Prime Bank Rate	3 LIBOR Rate 3-Mo.	4 Com. Paper 1-Mo.	5 Treas. Bills 3-Mo.	6 Treas. Bills 6-Mo.	7 Treas. Bills 1-Yr.	---Intermediate-Term--- 8 Treas. Notes 2-Yr.	9 Treas. Notes 5-Yr.	10 Treas. Notes 10-Yr.	---Long-Term--- 11 Treas. Bond 30-Yr.	12 Aaa Corp. Bond	13 Baa Corp. Bond	14 State & Local Bonds	15 Home Mtg. Rate	Avg. For ---Qtr.--- A. Fed's Major Currency $ Index	---(Q-Q % Change)--- ---(SAAR)--- B. Real GDP	C. GDP Price Index	D. Cons. Price Index
Naroff Economic Advisors	2.5 H	5.5	2.9 H	2.6 H	2.7 H	2.9 H	3.1 H	3.4 H	4.0 H	4.4 H	4.8	5.3	6.1	4.3	6.2 H	87.0	1.8	2.8 H	2.8
Amherst Pierpont Securities	2.4	5.5 H	2.8	2.5	2.5	2.8	3.1 H	3.3	3.6	4.2	4.9 H	6.0 H	7.4 H	5.3 H	6.0	98.5	2.6	2.3	3.4 H
Moody's Analytics	2.2	5.4	2.5	2.1	1.6	1.7	2.3	2.5	3.2	3.8	4.4	5.3	6.9	na	5.4	na	2.9	2.0	3.0
RBC	2.1	na	na	na	1.9	na	na	2.6	3.0	3.3	3.8	na	na	na	na	na	2.7	2.0	2.2
RDQ	2.1	5.1	2.4	2.2	2.2	2.4	2.6	2.7	3.1	3.5	3.9	5.0	6.0	4.7	5.1	100.5 H	1.7	2.3	2.7
GLC Financial Economics	2.0	5.0	2.2	2.1	1.9	2.0	2.1	2.3	3.2	3.7	4.4	5.8	7.0	5.2	6.2 H	92.3	3.1	2.4	2.8
High Frequency Economics	2.0	5.1	na	na	2.0	2.1	2.1	1.9	2.4	2.9	3.6	na	na	na	na	na	2.3	2.8 H	2.8
Swiss Re	1.9	4.9	2.0	1.6	1.6	1.7	2.0	2.2	2.5	3.0	3.8	4.7	5.6	na	4.8	na	1.9	1.4 L	2.4
DePrince & Assoc.	1.8	4.8	2.2	2.0	1.9	2.1	2.5	2.9	3.1	3.6	3.9	5.3	6.3	5.0	5.4	93.8	2.7	2.3	2.6
MacroFin Analytics	1.8	4.9	2.0	1.8	1.7	1.8	2.0	2.2	2.8	3.3	4.2	5.3	6.5	4.8	5.1	95.3	2.2	2.0	2.1
Goldman Sachs & Co.	1.8	na	2.0	na	1.7	na	na	2.2	2.8	3.1	3.4	na	na	na	4.9	na	2.0	1.9	2.2
Scotiabank Group	1.8	na	na	na	2.3	na	na	2.8	3.0	3.2	3.6	na	na	na	na	na	2.6	2.0	2.3
Nat'l Assn. of Realtors	1.7	4.7	1.9	1.8	1.7	1.9	2.0	2.2	2.8	2.9	3.9	5.0	6.0	4.6	4.9	na	2.2	2.0	2.1
Economist Intelligence Unit	1.7	4.7	1.9	1.6	1.7	1.8	1.6	2.1	2.4	3.0	3.8	na	na	na	4.9	na	2.4	na	2.3
J.P. Morgan Chase	1.6	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.0	2.0	2.5
MUFG Union Bank	1.6	4.8	1.9	1.7	1.6	1.9	2.1	2.3	2.5	2.9	3.3	4.7	6.1	4.0	4.7	91.0	2.3	1.4 L	2.3
Wells Capital Management	1.5	4.8	1.8	1.7	1.7	1.8	2.0	2.2	2.3	2.7	3.2	4.6	6.0	4.3	4.4	96.2	2.5	1.9	2.2
Stone Harbor Investment Partners	1.5	4.6	1.7	1.5	1.4	1.5	1.7	2.0	2.4	2.8	3.4	4.3	5.0 L	na	4.2	94.0	2.0	2.8 H	2.0
Chmura Economics & Analytics	1.5	4.5	1.8	1.5	1.3	1.7	1.9	2.2	3.1	3.6	4.4	5.2	na	na	5.2	82.5 L	3.0	2.0	2.2
RidgeWorth Investments	1.5	4.5	1.9	1.6	1.4	1.6	1.8	2.2	3.0	3.5	4.3	5.1	6.3	4.4	5.2	89.0	2.5	2.2	2.2
UBS AG	1.5	na	2.0	na	1.8	na	na	na	na	2.2	na	na	na	na	na	na	2.8	2.3	2.6
Standard & Poor's Corp.	1.5	4.3	1.8	na	1.4	1.6	1.8	2.0	2.5	3.0	3.7	4.3	5.5	na	4.9	93.8	2.7	2.4	2.8
The Northern Trust Company	1.4	4.6	1.5	1.4	1.3	1.4	1.6	2.0	2.6	3.1	3.9	4.6	5.7	4.4	4.7	na	2.2	1.8	1.9
Comerica Bank	1.4	4.4	1.7	na	1.3	1.4	1.6	1.9	2.2	2.7	3.5	na	na	na	4.4	na	2.4	1.9	2.0
Oxford Economics	1.4	4.3	na	na	1.4	1.6	1.7	1.8	2.2	2.6	na	na	na	na	4.6	96.1	2.6	2.3	2.1
DS Economics	1.4	4.5	1.6	1.4	1.3	1.6	1.9	2.2	2.6	3.0	3.8	4.2	5.5	4.6	4.7	89.0	1.8	2.2	2.4
Wells Fargo	1.4	4.5	1.5	1.5	1.5	1.6	1.7	1.8	2.0	2.4	3.0	4.3	5.6	3.8	4.3	98.5	2.4	2.0	2.2
Chase Wealth Management	1.4	4.5	1.5	1.5	1.4	1.5	1.8	2.0	2.4	3.0	3.8	4.8	6.1	4.5	4.8	90.5	2.3	2.1	2.3
RBS Securities	1.4	4.5	2.0	1.4	1.5	1.6	1.8	2.4	2.7	3.1	3.4	4.8	6.0	4.1	4.9	96.0	2.7	1.7	2.4
Nomura Securities, Inc.	1.4	4.4	1.6	1.6	na	na	na	1.0 L	1.5	2.0	2.6	4.3	5.6	na	4.0	na	1.9	1.5	2.1
PNC Financial Services Corp.	1.4	4.5	1.6	na	1.4	1.4	1.5	1.9	2.2	2.6	3.1	na	5.4	3.5	4.2	93.5	2.2	2.0	2.3
Barclays Capital	1.4	4.5	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.5	2.5	2.4
SunTrust Banks	1.4	4.4	2.5	2.1	1.2	1.3	1.3	1.4	1.9	2.2	2.8	5.3	6.9	4.0	5.4	na	3.2 H	2.1	2.5
Moody's Capital Markets Group	1.3	4.5	1.6	1.4	1.3	1.4	1.5	1.5	1.8	2.1	2.6 L	3.7 L	5.2	3.2 L	3.9 L	93.0	1.8	2.0	1.4 L
Regions Financial Corporation	1.3	4.5	1.7	1.5	1.4	1.6	1.7	1.9	2.4	3.0	3.7	4.5	5.7	na	4.6	91.2	1.9	1.7	2.4
Cycledata Corp.	1.3	4.5	1.5	1.2	1.1	1.2	1.3	1.6	2.2	2.7	3.1	4.4	5.6	3.9	4.4	93.0	1.9	2.1	2.4
Societe Generale	1.3	4.3	1.6	na	na	na	na	1.4	1.9	2.5	3.2	na	na	na	na	na	2.3	2.2	2.6
Loomis, Sayles & Company	1.3	4.3	1.5	1.4	1.3	1.5	1.6	2.0	2.3	2.8	3.0	4.3	5.4	3.7	4.4	92.7	1.9	2.3	2.1
Daiwa Capital Markets America	1.3	4.4	1.5	1.3	1.2	1.4	1.5	1.9	2.2	2.5	3.2	4.4	5.3	3.8	4.3	95.0	2.1	2.0	2.3
Action Economics	1.2	4.3	1.4	1.3	1.2	1.3	1.5	1.7	2.1	2.5	3.2	4.1	5.7	3.6	4.1	na	2.3	2.4	2.0
BMO Capital Markets	1.2	4.3	1.5	na	1.4	1.3	1.5	1.7	2.2	2.6	3.2	na	na	na	4.4	94.2	2.1	2.0	2.2
Woodworth Holdings	1.2	4.3	1.4	1.1 L	1.1 L	1.2	1.4	1.8	2.4	2.9	3.6	4.8	6.1	4.2	4.7	94.0	2.5	1.4	1.5
Fannie Mae	1.2	4.3	na	na	1.2	1.3	1.3	1.4	1.9	2.2	2.9	na	na	na	3.9 L	na	1.9	1.9	2.2
Georgia State University	1.1	4.1 L	na	na	1.1 L	1.0 L	1.1 L	1.4	2.2	3.0	3.6	4.8	5.8	na	4.8	na	2.5	1.9	2.9
BNP Paribas Americas	0.4 L	na	1.0 L	na	na	na	na	1.1	1.4 L	1.7 L	na	na	na	na	na	na	1.6 L	na	2.3
April Consensus	**1.5**	**4.6**	**1.8**	**1.7**	**1.6**	**1.7**	**1.8**	**2.0**	**2.5**	**2.9**	**3.6**	**4.8**	**5.9**	**4.2**	**4.8**	**93.2**	**2.3**	**2.1**	**2.3**
Top 10 Avg.	2.1	5.1	2.4	2.1	2.1	2.2	2.4	2.7	3.2	3.7	4.3	5.4	6.6	4.7	5.5	96.4	2.8	2.5	2.8
Bottom 10 Avg.	1.1	4.3	1.4	1.3	1.2	1.3	1.4	1.4	1.9	2.2	2.9	4.2	5.4	3.8	4.2	89.8	1.8	1.7	1.9
March Consensus	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Number of Forecasts Changed From A Month Ago:																			
Down	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Same	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Up	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Diffusion Index	na %	na %	na %	na %	na %	na %	na %	na %	na %	na %	na %	na %	na %	na %	na %	na %	na %	na %	na %

International Interest Rate And Foreign Exchange Rate Forecasts

United States

	3 Mo. Interest Rate %			10 Yr. Gov't Bond Yield %			Fed's Major Currency $ Index		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	1.93	2.00	na	na	na	na
BMO Capital Markets	0.90	0.90	1.10	2.10	2.15	2.40	95.4	96.5	5.8
BNP Paribas Americas	na	na	na	1.75	1.65	na	na	na	na
ING Financial Markets	0.65	0.80	0.85	1.60	1.80	2.20	99.7	98.9	95.5
Mizuho Research Institute	0.60	0.60	0.85	1.90	1.90	2.00	92.0	89.0	91.0
Moody's Analytics	na	na	na	2.28	2.53	3.27	na	na	na
Moody's Capital Markets	na	na	na	2.15	2.25	2.27	91.5	92.5	92.7
Nomura Securities	na	na	na	2.20	1.95	2.50	na	na	na
Oxford Economics	na	na	na	2.02	2.13	2.35	95.8	96.7	97.0
Scotiabank	na	na	na	2.25	2.35	2.75	na	na	na
UBS AG	na	na	na	1.92	1.96	2.08	na	na	na
Wells Fargo	0.95	1.20	1.70	2.03	2.12	2.39	92.5	94.0	97.3
April Consensus	**0.78**	**0.88**	**1.13**	**2.01**	**2.07**	**2.42**	**94.5**	**94.6**	**79.9**
High	0.95	1.20	1.70	2.28	2.53	3.27	99.7	98.9	97.3
Low	0.60	0.60	0.85	1.60	1.65	2.00	91.5	89.0	5.8
Last Months Avg.	0.75	0.91	1.19	2.06	2.13	2.46	92.9	92.8	92.9

Japan

	3 Mo. Interest Rate %			10 Yr. Gov't Bond Yield %			Yen/USD		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	-0.10	-0.08	na	103.3	100.0	na
BMO Capital Markets	0.00	0.00	0.00	0.15	0.20	0.40	119.0	122.0	123.0
BNP Paribas Americas	na	na	na	-0.10	-0.10	na	108.0	110.0	na
ING Financial Markets	0.05	0.02	0.01	-0.15	-0.07	0.02	124.0	126.0	132.0
Mizuho Research Institute	0.05	0.05	0.05	0.00	0.00	0.20	110.0	108.0	113.0
Moody's Analytics	na	na	na	0.00	0.01	0.01	118.0	120.0	124.0
Moody's Capital Markets	na	na	na	0.01	0.05	0.10	115.0	118.0	121.0
Nomura Securities	na	na	na	0.05	0.05	0.05	118.0	120.0	na
Oxford Economics	na	na	na	-0.05	-0.75	-0.05	116.3	119.3	123.2
Scotiabank	na	na	na	na	na	na	129.0	130.0	133.0
UBS AG	na	na	na	0.13	0.17	0.23	na	na	na
Wells Fargo	-0.10	-0.15	-0.25	-0.10	-0.10	0.00	na	na	na
April Consensus	**0.00**	**-0.02**	**-0.05**	**-0.02**	**-0.06**	**0.11**	**116.1**	**117.3**	**124.2**
High	0.05	0.05	0.05	0.15	0.20	0.40	129.0	130.0	133.0
Low	-0.10	-0.15	-0.25	-0.15	-0.75	-0.05	103.3	100.0	113.0
Last Months Avg.	0.09	0.05	0.04	0.48	0.06	0.12	117.6	119.0	123.5

United Kingdom

	3 Mo. Interest Rate %			10 Yr. Gilt Yields %			USD/Pound Sterling		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	1.68	1.75	na	1.42	1.45	na
BMO Capital Markets	na	na	na	1.65	1.80	2.15	1.36	1.41	1.48
BNP Paribas Americas	na	na	na	1.40	1.47	na	1.51	1.55	na
ING Financial Markets	0.65	0.70	1.20	1.90	2.10	2.40	1.31	1.38	1.47
Mizuho Research Institute	0.60	0.60	0.70	1.50	1.50	1.70	na	na	na
Moody's Analytics	na	na	na	1.88	2.15	2.69	1.43	1.47	1.50
Moody's Capital Markets	na	na	na	1.45	1.55	1.55	1.42	1.41	1.40
Nomura Securities	na	na	na	1.85	1.90	na	1.46	1.47	na
Oxford Economics	na	na	na	1.57	1.81	2.15	1.37	1.38	1.40
Scotiabank	na	na	na	na	na	na	1.35	1.40	1.45
UBS AG	na	na	na	1.60	1.70	1.85	na	na	na
Wells Fargo	0.60	0.60	0.95	1.50	1.60	2.00	na	na	na
April Consensus	**0.62**	**0.63**	**0.95**	**1.63**	**1.76**	**2.06**	**1.40**	**1.44**	**1.45**
High	0.65	0.70	1.20	1.90	2.15	2.69	1.51	1.55	1.50
Low	0.60	0.60	0.70	1.40	1.47	1.55	1.31	1.38	1.40
Last Months Avg.	0.61	0.66	1.03	1.79	1.89	2.15	1.41	1.42	1.45

Switzerland

	3 Mo. Interest Rate %			10 Yr. Gov't Bond Yield %			CHF/USD		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	na	na	na	1.04	1.08	na
BMO Capital Markets	na	na	na	na	na	na	1.01	1.03	1.07
BNP Paribas Americas	na	na	na	na	na	na	0.98	0.99	na
ING Financial Markets	-0.80	-0.80	-0.90	-0.40	-0.30	0.20	1.02	1.01	0.98
Mizuho Research Institute	na	na	na	na	na	na	na	na	na
Moody's Analytics	na	na	na	-0.31	.-31	0.21	1.01	1.04	1.09
Moody's Capital Markets	na	na	na	-0.28	-0.24	0.00	0.97	0.98	0.98
Nomura Securities	na	na	na	na	na	na	1.03	1.05	na
Oxford Economics	na	na	na	-0.44	-0.37	-0.03	1.01	1.03	1.04
Scotiabank	na	na	na	na	na	na	1.09	1.16	1.16
UBS AG	na	na	na	-0.20	-0.05	0.23	na	na	na
Wells Fargo	na	na	na	na	na	na	na	na	na
April Consensus	**-0.80**	**-0.80**	**-0.90**	**-0.33**	**-0.24**	**0.12**	**1.02**	**1.04**	**1.05**
High	-0.80	-0.80	-0.90	-0.20	-0.05	0.23	1.09	1.16	1.16
Low	-0.80	-0.80	-0.90	-0.44	-0.37	-0.03	0.97	0.98	0.98
Last Months Avg.	-0.80	-0.90	-0.90	-0.08	0.09	0.30	1.05	1.07	1.07

Canada

	3 Mo. Interest Rate %			10 Yr. Gov't Bond Yield %			CAD/USD		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	na	na	na	1.37	1.39	na
BMO Capital Markets	na	na	na	1.40	1.45	1.60	1.39	1.39	1.34
BNP Paribas Americas	na	na	na	na	na	na	1.48	1.50	na
ING Financial Markets	0.50	0.50	0.50	1.30	1.30	1.70	1.50	1.47	1.42
Mizuho Research Institute	na	na	na	na	na	na	na	na	na
Moody's Analytics	na	na	na	1.89	2.17	2.99	1.37	1.35	1.30
Moody's Capital Markets	na	na	na	1.35	1.45	1.50	1.32	1.33	1.32
Nomura Securities	na	na	na	1.45	1.50	1.70	1.39	1.40	na
Oxford Economics	na	na	na	1.24	1.33	1.49	1.43	1.42	1.40
Scotiabank	na	na	na	1.40	1.55	1.90	1.38	1.39	1.35
UBS AG	na	na	na	1.25	1.38	1.58	na	na	na
Wells Fargo	0.88	0.88	1.00	1.35	1.40	1.70	na	na	na
April Consensus	**0.69**	**0.69**	**0.75**	**1.40**	**1.50**	**1.80**	**1.40**	**1.40**	**1.35**
High	0.88	0.88	1.00	1.89	2.17	2.99	1.50	1.50	1.42
Low	0.50	0.50	0.50	1.24	1.30	1.49	1.32	1.33	1.30
Last Months Avg.	0.60	0.63	0.70	1.33	1.47	1.76	1.42	1.42	1.38

International Interest Rate And Foreign Exchange Rate Forecasts

Australia

	3 Mo. Interest Rate %			10 Yr. Gov't Bond Yield %			USD/AUD		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	na	na	na	0.70	0.69	na
BMO Capital Markets	na	na	na	na	na	na	0.69	0.71	0.74
BNP Paribas Americas	na	na	na	2.25	2.15	na	0.67	0.65	na
ING Financial Markets	2.10	1.90	1.90	2.40	2.60	2.90	0.65	0.65	0.70
Mizuho Research Institute	na	na	na	na	na	na	na	na	na
Moody's Analytics	na	na	na	2.77	2.77	2.99	0.73	0.72	0.70
Moody's Capital Markets	na	na	na	2.52	2.50	2.48	0.76	0.76	0.77
Nomura Securities	na	na	na	2.80	2.70	2.90	0.66	0.65	na
Oxford Economics	na	na	na	2.89	3.00	3.27	0.70	0.70	0.70
Scotiabank	na	na	na	na	na	na	0.68	0.65	0.68
UBS AG	na	na	na	2.54	2.52	2.55	na	na	na
Wells Fargo	na	na	na	na	na	na	na	na	na
April Consensus	**2.10**	**1.90**	**1.90**	**2.60**	**2.61**	**2.85**	**0.69**	**0.69**	**0.71**
High	2.10	1.90	1.90	2.89	3.00	3.27	0.76	0.76	0.77
Low	2.10	1.90	1.90	2.25	2.15	2.48	0.65	0.65	0.68
Last Months Avg.	2.10	1.90	1.90	2.67	2.70	2.99	0.68	0.67	0.70

Eurozone

	3 Mo. Interest Rate %			USD/EUR		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	1.09	1.05	na
BMO Capital Markets	-0.20	-0.20	-0.20	1.08	1.05	1.04
BNP Paribas Americas	na	na	na	1.16	1.15	na
ING Financial Markets	-0.32	-0.35	-0.38	1.05	1.05	1.12
Mizuho Research Institute	-0.30	-0.30	-0.30	1.16	1.17	1.14
Moody's Analytics	na	na	na	1.09	1.06	1.02
Moody's Capital Markets	na	na	na	1.10	1.08	1.07
Nomura Securities	-0.25	-0.25	-0.25	1.08	1.07	na
Oxford Economics	na	na	na	1.08	1.06	1.06
Scotiabank	na	na	na	1.00	0.95	0.98
UBS AG	na	na	na	na	na	na
Wells Fargo	-0.27	-0.30	-0.30	na	na	na
April Consensus	**-0.27**	**-0.28**	**-0.29**	**1.09**	**1.07**	**1.06**
High	-0.20	-0.20	-0.20	1.16	1.17	1.14
Low	-0.32	-0.35	-0.38	1.00	0.95	0.98
Last Months Avg.	-0.21	-0.22	-0.22	1.06	1.06	1.06

10 Yr. Gov't Bond Yields %

	Germany			France			Italy			Spain		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	0.43	0.50	na	na	na	na	na	na	na	na	na	na
BMO Capital Markets	0.35	0.40	0.70	na	na	na	na	na	na	na	na	na
BNP Paribas Americas	0.30	0.00	na	0.60	0.30	na	1.45	1.25	na	1.55	1.35	na
ING Financial Markets	0.25	0.40	0.80	0.60	0.70	1.00	1.25	1.35	1.55	1.30	1.40	1.50
Mizuho Research Institute	0.30	0.30	0.35	na	na	na	na	na	na	na	na	na
Moody's Analytics	0.42	0.44	0.70	1.09	1.12	1.17	1.51	1.55	1.80	1.78	1.90	2.10
Moody's Capital Markets	0.25	0.35	0.75	0.61	0.73	1.15	1.35	1.50	1.95	1.48	1.64	2.05
Nomura Securities	0.35	0.40	0.45	na	na	na	na	na	na	na	na	na
Oxford Economics	0.15	0.22	0.57	0.38	0.45	1.05	1.39	1.48	1.86	1.55	1.63	1.97
UBS	0.69	0.89	1.20	0.90	1.10	1.45	1.73	1.90	2.10	na	na	na
Wells Fargo	0.30	0.30	0.50	na	na	na	na	na	na	na	na	na
April Consensus	**0.34**	**0.38**	**0.67**	**0.70**	**0.73**	**1.16**	**1.45**	**1.51**	**1.85**	**1.53**	**1.58**	**1.91**
High	0.69	0.89	1.20	1.09	1.12	1.45	1.73	1.90	2.10	1.78	1.90	2.10
Low	0.15	0.00	0.35	0.38	0.30	1.00	1.25	1.25	1.55	1.30	1.35	1.50
Last Months Avg.	0.43	0.49	0.74	0.80	0.86	1.22	1.55	1.63	2.00	1.62	1.66	1.98

Consensus Forecasts 10-year Bond Yields vs U.S. Yield

	Current	In 3 Mo.	In 6 Mo.	In 12 Mo.
Japan	-2.00	-2.03	-2.12	-2.31
United Kingdom	-0.37	-0.38	-0.31	-0.36
Switzerland	-2.29	-2.34	-2.31	-2.30
Canada	-0.58	-0.61	-0.56	-0.63
Australia	0.69	0.58	0.54	0.43
Germany	-1.70	-1.67	-1.68	-1.75
France	-1.34	-1.31	-1.33	-1.26
Italy	-0.65	-0.56	-0.56	-0.57
Spain	-0.39	-0.48	-0.48	-0.52

Consensus Forecasts 3 Mo. Deposit Rates vs U.S. Rate

	Current	In 3 Mo.	In 6 Mo.	In 12 Mo.
Japan	-0.63	-0.78	-0.86	-1.17
United Kingdom	-0.05	-0.16	-0.24	-0.18
Switzerland	-1.35	-1.58	-1.68	-2.03
Canada	0.21	-0.09	-0.19	-0.38
Australia	1.76	1.33	1.03	0.78
Eurozone	-0.86	-1.04	-1.04	-1.41

Viewpoints: A Sampling of Views on the Economy, Financial Markets and Government Policy Excerpted from Recent Reports Issued by our Blue Chip Panel Members and Others

Inflation Finally Begins To Firm

Inflation has made a healthy and at least partly unexpected recovery over the last half year. Yet the FOMC took a puzzlingly skeptical view of the encouraging recent news at its March meeting. The median participant now projects that core PCE inflation will decline to 1.6% by end-2016 and rise to only 1.8% by end-2017, down from 1.9% in the December 2015 projection. In addition, in her post-meeting press conference, Fed Chair Janet Yellen downplayed the recent firming and expressed doubt that it will persist. In this week's Analyst, we take a closer look at the recent inflation pick-up, possible explanations for the FOMC's soft forecast, and the inflation outlook for the rest of the year.

Since late 2014, the FOMC has maintained a consistent narrative on inflation consisting of two parts. First, the FOMC attributed the low current rate of inflation largely to transitory factors, especially pass-through from the strong dollar and declining energy prices, and to non-market prices, especially administrative cuts to health care prices. Second, the FOMC argued that the inflation outlook was much healthier than the recent data implied because inflation expectations were well-anchored and the labor market was strengthening.

Over the last half year, this view appears to have worked out quite well. Both core and headline CPI and PCE inflation have risen significantly. In addition, a wide range of other inflation measures designed to reduce noise and capture momentum—including the trimmed mean, median, sticky price, and market-based measures—has risen to a similar degree.

Moreover, inflation has risen for the right reasons. The first part of the Fed's story—that the transitory factors depressing inflation would eventually fade—proved frustrating initially as dollar appreciation and energy price declines lasted longer than anticipated. But, imported consumer goods prices are now down only modestly year-on-year, energy prices are stabilizing, and health care services inflation has partially normalized as the impact of one-time price cuts associated with the Affordable Care Act have dropped out of the year-on-year calculation.

The second part of the Fed's story also appears to have been vindicated by the broad-based pick-up in core inflation. Almost every top-level category of the core PCE index has accelerated at least a bit over the last half year.

Overall, recent progress toward the target has not only been more rapid than Fed officials anticipated, but also appears to fit the framework behind the FOMC's long-standing inflation view nicely. What then accounts for the Committee's lukewarm reaction to this encouraging news?

The skeptical inflation view that came out of the March FOMC meeting oversimplifies the range of positions held by participants. Some, in particular Vice Chair Stanley Fischer, have greeted the recent data as an early sign that inflation is accelerating as full employment nears. But others appear skeptical. Their reasons fall into three categories: (1) a view that the recent pick-up reflects idiosyncratic one-offs; (2) expected downside from softer inflation expectations; and (3) expected downside from dollar appreciation and global weakness. We next take a closer look at each of these concerns.

The first concern was highlighted by Chair Yellen's remark during the March press conference that "some transitory factors" influenced the recent acceleration. After three years of arguing that inflation has been low for transitory reasons, some Fed officials now see inflation as high for transitory reasons. We agree that the spike in apparel prices in the February CPI looks anomalous and likely reflects abnormal seasonal patterns that might reverse in March. But there is always some category-level idiosyncrasy, and we do not see the increase over the last half-year as an artifact of such factors.

The second concern was highlighted by President Dudley's comment that a "continued period of low headline inflation ... could lead to significantly lower inflation expectations ... [that] would, in turn, tend to depress future inflation." This is certainly a legitimate fear: after all, the corollary of a flatter Phillips curve is that inflation expectations matter more for actual inflation. However, the recent declines in the Michigan and New York Fed measures of consumer inflation expectations appear to have been driven largely by lower gasoline prices, and we are therefore less convinced that they merit a substantial downgrade to the inflation outlook. Furthermore, both measures rebounded somewhat in March.

The third concern—that dollar strength poses downside risks to inflation that have yet to fully materialize—has been highlighted frequently by Governor Brainard. We are doubtful that much missing pass-through is still in the pipeline, both because the lags between the dollar and import prices appear to be relatively short and because the modest decline in core goods prices has actually tracked the limited decline in consumer goods import prices quite closely.

Can these factors explain the Fed's soft inflation projections? To find out, we use a model of core inflation described by Chair Yellen in a recent speech to simulate the impact of a further 5% appreciation of the dollar and a 0.25pp decline in inflation expectations.[1] The 5% dollar shock reduces core PCE by 0.1-0.15pp in Yellen's model after one year, a larger effect than we think is likely based on our own bottom-up analysis. The 0.25pp inflation expectations shock reduces core PCE by 0.15-0.2pp after the first year if it is permanent, but by just 0.05pp if it instead lasts only one quarter. These estimates suggest concern about lower inflation expectations and past or future dollar appreciation likely account for the FOMC's below consensus inflation projection, though we do not share their degree of concern.

We view the Fed's earlier inflation narrative as the right baseline for the rest of the year, even if some FOMC participants seem to have lost faith. Disinflationary forces are fading; pass-through from both the dollar and lower energy prices has been smaller than initially anticipated and has largely disappeared in recent months. Meanwhile, inflationary forces are likely to strengthen as the labor market tightens further. While we share the view of Fed officials that the Phillips curve has flattened, we have greater confidence that further declines in slack from a starting point close to full employment will result in firmer inflation. Recent data from the local level support this expectation. Cities with lower unemployment rates in 2015 did indeed experience firmer inflation.

Our bottom-up inflation model projects a modest further pick-up this year. Rent inflation is likely to remain roughly stable at its current high level as new supply yields only a modest rise in the vacancy rate. Health services inflation is likely to accelerate a bit further, driven by faster wage growth for health care workers. Transportation services inflation is likely to continue to normalize as the lagged effect of past energy price declines fades, and other services categories are likely to experience faster inflation as slack declines further. While we see some downside for apparel prices as the February spike reverses and our equity analysts expect softer motor vehicle prices, inflation in other core goods categories is likely to pick up a bit as the impact of past import price declines fades.

Adding up, we expect core PCE inflation to initially dip to 1.6% at midyear before reaching 1.8% by 2016Q4, *(continued on next page)*

Viewpoints

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0.2pp above the median FOMC participant's projection. We expect headline PCE inflation to rise to 1.5% by 2016Q4, 0.3pp above the median FOMC participant's projection. While our headline forecast uses current oil and natural gas futures to project energy prices, assuming flat paths instead does not substantially change our forecast.

As the year progresses, we expect FOMC participants to gradually revise up their inflation projections. Largely for this reason, we expect that a Committee that viewed a pick-up in core inflation to 1.6% by year-end as sufficient progress to justify four hikes at the time of liftoff will ultimately conclude that an acceleration to 1.8% merits three hikes this year rather than two.

David Mericle and Chris Mischaiko, Goldman Sachs, New York, NY

The Fed: Back To Hawkish Signals?

One week after the Federal Open Market Committee sent dovish signals in the form of lower interest rate projections, some Fed officials muddied the waters by suggesting the possibility of a near-term increase in interest rates -- perhaps at the April 26-27 FOMC meeting. We found the developments in the past two weeks perplexing, and we don't claim to have an explanation for the apparently conflicting signals, but we can offer a hypothesis.

Market participants tend to focus on the median projection in the dot plot, and that view indeed showed that the FOMC had scaled back the expected degree of tightening (a new median of 0.875 percent versus 1.375 percent in December). However, Fed officials have a range of views on appropriate policy, and their comments in speeches and interviews are likely to reflect their personal views rather than the median forecast. The new dot plot had seven officials with projections above the new median, with four of them envisioning four increases this year. The policymakers suggesting a near-term increase in interest rates were probably from the group with above-median expectations. With only six FOMC meetings remaining this year, officials expecting three or four rate increases would probably feel a need to get going.

Although probably not intended by the Fed speakers, their comments reinforce the point made frequently by Janet Yellen that all meetings are "live." That is, policy can change at any time. Market participants seem to assume that the Fed will change policy only at meetings that involve a press conference. However, talk of a hike in April (no press conference) indicates that Fed officials are on a different wave length; they are willing to alter policy at any meeting.

We also were surprised by another comment from a Fed official. Charles Evans of the Chicago Fed, an ardent dove, noted that an expectation of two rate hikes this year was not an unreasonable view. He has made strong arguments in the past for an accommodative stance, and thus we were struck by his suggestion of higher interest rates.

Upon reflection, we should not have been surprised by his comment. The new dot plot shows only one official with an expectation below the median rate, and even this view involves an additional rate hike this year (0.625 percent versus the midpoint of 0.375 percent for the current target range). That is, all Fed officials see rates moving higher this year. Even if Mr. Evans submitted the lone dot below the median, which is quite possible, he still expects the Fed to continue the process of policy normalization, and thus he might describe two rates hikes rather than one as "not unreasonable."

Michael Moran, Daiwa Capital Markets, New York, NY

Economic Weekly

March has been a better month for U.S. financial markets. Equity markets have now largely clawed back their January and early February losses. Long-term bond yields have increased, but not by as much as they would have without the downward pressure from negative inter-est rates in Europe and Japan.

Oil prices have bounced off their earlier lows. West Texas Intermediate has been near $40 per barrel for most of this month. Every day in the new $40 range suggests that the floor for global oil markets is firmer. Some industry experts are voicing stronger opinions lately in favor of significantly higher crude oil prices by the end of this year. But even if that optimistic (for the energy industry) scenario does happen, it will take more months for the industry to fully respond with a meaningful upturn in activity. Labor resources have dwindled. Machinery has not been maintained. Credit conditions will remain tight for exploration and production companies this year.

One area that continues to underperform is home sales. Prices are up, inventories are tight, but the number of new and existing homes sales on a monthly basis re-mains range bound, showing little upward momentum over the last year. New homes sales for February gained 2.0 percent to hit a 512,000 unit annual rate. We believe that improving labor market conditions and easier credit, especially for first time buyers, will help elevate the rate of new home sales this year.

Existing home sales fell by 7.1 percent in February to hit a 5.08 million unit annual rate. Inventories of available existing homes are tight at 4.4 months' supply. In February, the median price of an existing home was up 4.4 percent over the previous 12 months.

New orders for durable goods decreased by 2.8 percent in February. Both commercial and defense air-craft were big losers in February, after being big winners in January. Other areas were also weak in February. New orders for nondefense capital goods excluding aircraft were down by 1.8 percent. While some regional manufacturing indicators have improved lately, we still believe that significant headwinds remain for U.S. manufacturing. The strong dollar, weak global demand, peak auto production and the consolidating energy sector are still important economic factors for 2016.

Initial claims for unemployment insurance for the week ending March 19 increased by 6,000, to reach 265,000, still a very good number. Continuing claims for the week ending March 12 dropped by 39,000 to hit 2,179,000, amongst the best numbers for that series in this millennium.

The third estimate of 2015Q4 real GDP growth was better than expected, rising to 1.4 percent, double the growth rate of the first estimate. It's a backward look-ing number but it does warm the economic heart to know that the end of last year was not as weak as first thought. The bad news in the GDP report came from corporate profits, which declined by 7.8 percent for the quarter (not annualized). This was the third quarterly decline in nominal corporate profits over the last four quarters.

Recent statements and speeches by Federal Re-serve officials reinforce expectations for two interest rate hikes this year, set by the dot plot released on March 16. We will continue to show two fed funds rate hikes this year in our monthly interest rate forecast, one in June and one in December.

Robert A. Dye, Comerica Bank, Dallas, TX

Special Questions:

1. Please provide your forecasts of the Q1 2016 percent change (saar) in real GDP, the GDP Price Index and the Consumer Price Index.

		Q4 2015 (saar)	
	Real GDP	GDP Price Index	Consumer Price Index
Consensus	**1.92%**	**1.13%**	**0.05%**
Top 10 Average	2.43%	1.90%	0.75%
Bottom 10 Average	1.38%	0.51%	-0.43%

2. What will be the Federal Open Market Committee's NEXT move?

(Percent of those responding)

An interest rate hike	An interest rate cut	Negative interest rates	A new QE program
100%	0.0%	0.0%	0.0%

3. If you believe the NEXT policy move by the FOMC will be an interest rate INCREASE at what meeting will it be announced?

(Percentage of those responding)

Apr. 26-27	Jun. 14-15	Jul. 26-27	Sep. 20-21
0.0%	86.0%	4.7%	4.7%

Nov. 1-2	Dec. 13-14	In 2017 or later
0.0%	2.3%	2.3%

4. The mid-point of the FOMC's current federal funds rate target range of 0.25%-0.50% is 0.375%. The March median interest rate projections from the FOMC put the fed funds rate at 0.875% at the end of 2016 and 1.875% at the end of 2017, both 50 basis points lower than estimated at the December 2015 meeting. What do you think will be the mid-point of the FOMC's fed funds rate target range at the end of 2016 and 2017?

	Mid-point of federal funds rate target range at end of:	
	2016	2017
Consensus	**0.932%**	**1.865%**
Top 10 Average	1.213%	2.550%
Bottom 10 Average	0.750%	1.281%

5. What are the odds that a U.S. recession will begin during 2016? If not in 2016, what are the odds that a recession will begin in 2017?

(Between 0% and 100%)

	Odds that a U.S. recession begins in 2016	Odds that a U.S. recession begins in 2017
Consensus	**16.17%**	**21.43%**
Top 10 Average	23.50%	32.50%
Bottom 10 Average	4.68%	12.14%

6. Central banks around the world have found it difficult to get interest rates off the "zero bound". What are the odds that the U.S. federal funds rate is cut back to the zero bound by the end of 2017?

	(Between 0% and 100%)
Consensus	**18.80%**
Top 10 Average	31.00%
Bottom 10 Average	7.44%

7. The price index for personal consumption expenditures (PCE) and the PCE price index excluding food and energy prices (core PCE price index) were up 1.3% and 1.7%, respectively, on a y/y basis in January 2016. How much will they be up on a December-over-December basis in 2016?

	2016 December-over-December, percent change	
	PCE price index	Core PCE price index
Consensus	**1.65%**	**1.88%**
Top 10 Average	2.13%	2.25%
Bottom 10 Average	1.24%	1.59%

8. The unemployment rate remained at 4.9% in February. **What will be the unemployment rate in December 2016 and December 2017?**

	Unemployment rate in	
	December 2016	December 2017
Consensus	**4.64%**	**4.52%**
Top 10 Average	4.92%	4.96%
Bottom 10 Average	4.37%	4.07%

Databank:

2015 Historical Data

Monthly Indicator	Jan	Feb	Mar	Apr	May	Jun	Jly	Aug	Sep	Oct	Nov	Dec
Retail and Food Service Sales (a)	-0.4	-0.1										
Auto & Light Truck Sales (b)	17.45	17.43										
Personal Income (a, current $)	0.5											
Personal Consumption (a, current $)	0.5											
Consumer Credit (e)	3.6											
Consumer Sentiment (U. of Mich.)	92.0	91.7										
Household Employment (c)	615	530										
Non-farm Payroll Employment (c)	172	242										
Unemployment Rate (%)	4.9	4.9										
Average Hourly Earnings (All, cur. $)	25.38	25.35										
Average Workweek (All, hrs.)	34.6	34.4										
Industrial Production (d)	-0.7	-1.0										
Capacity Utilization (%)	77.1	76.7										
ISM Manufacturing Index (g)	48.2	49.5										
ISM Non-Manufacturing Index (g)	53.5	53.4										
Housing Starts (b)	1.120	1.178										
Housing Permits (b)	1.204	1.167										
New Home Sales (1-family, c)	502	512										
Construction Expenditures (a)	1.5											
Consumer Price Index (nsa., d)	1.4	1.0										
CPI ex. Food and Energy (nsa., d)	2.2	2.3										
Producer Price Index (n.s.a., d)	-0.2	0.0										
Durable Goods Orders (a)	4.2	-2.8										
Leading Economic Indicators (g)	-0.2											
Balance of Trade & Services (f)	-45.7											
Federal Funds Rate (%)	0.34	0.38										
3-Mo. Treasury Bill Rate (%)	0.26	0.31										
10-Year Treasury Note Yield (%)	2.09	1.78										

2015 Historical Data

Monthly Indicator	Jan	Feb	Mar	Apr	May	Jun	Jly	Aug	Sep	Oct	Nov	Dec
Retail and Food Service Sales (a)	-0.8	-0.5	1.5	0.0	1.2	0.0	0.8	0.0	-0.1	0.0	0.3	0.3
Auto & Light Truck Sales (b)	16.63	16.32	17.06	16.70	17.63	16.95	17.47	17.73	18.07	18.13	18.06	17.22
Personal Income (a, current $)	0.2	0.3	0.0	0.6	0.6	0.5	0.3	0.3	0.1	0.3	0.3	0.3
Personal Consumption (a, current $)	-0.4	0.2	0.5	0.3	0.9	0.3	0.3	0.3	0.2	0.1	0.4	0.1
Consumer Credit (e)	3.6	5.5	7.6	7.6	7.0	9.6	6.8	5.1	9.9	5.2	4.8	7.3
Consumer Sentiment (U. of Mich.)	98.1	95.4	93.0	95.9	90.7	96.1	93.1	91.9	87.2	90.0	91.3	92.6
Household Employment (c)	665	127	102	176	239	-26	144	177	-101	255	247	485
Non-Farm Payroll Employment (c)	221	265	84	251	273	228	277	150	149	295	280	271
Unemployment Rate (%)	5.7	5.5	5.5	5.4	5.5	5.3	5.3	5.1	5.1	5.0	5.0	5.0
Average Hourly Earnings (All, cur. $)	24.76	24.80	24.87	24.91	24.97	24.96	25.03	25.12	25.14	25.21	25.27	25.26
Average Workweek (All, hrs.)	34.6	34.6	34.5	34.5	34.5	34.5	34.6	34.6	34.5	34.5	34.5	34.5
Industrial Production (d)	4.5	3.5	2.4	2.1	1.4	0.9	1.3	1.3	0.7	0.5	-1.2	-1.8
Capacity Utilization (%)	78.7	78.4	78.2	78.0	77.6	77.5	78.0	77.9	77.8	77.6	77.0	76.5
ISM Manufacturing Index (g)	53.5	53.3	52.3	51.6	53.1	53.1	51.9	51.0	50.0	49.4	48.4	48.0
ISM Non-Manufacturing Index (g)	56.7	57.1	56.9	57.5	55.9	56.2	59.6	58.3	56.7	58.3	56.6	55.8
Housing Starts (b)	1.080	0.900	0.954	1.190	1.072	1.211	1.152	1.116	1.207	1.071	1.176	1.159
Housing Permits (b)	1.059	1.098	1.038	1.140	1.250	1.337	1.130	1.161	1.105	1.161	1.282	1.204
New Home Sales (1-family, c)	521	545	485	508	513	469	500	507	457	480	511	540
Construction Expenditures (a)	1.5	0.4	1.5	3.1	2.1	0.5	0.0	0.6	0.2	-0.1	-0.5	0.6
Consumer Price Index (s.a., d)	-0.1	0.0	-0.1	-0.2	0.0	0.1	0.2	0.2	0.0	0.2	0.5	0.7
CPI ex. Food and Energy (s.a., d)	1.6	1.7	1.8	1.8	1.7	1.8	1.8	1.8	1.9	1.9	2.0	2.1
Producer Price Index (n.s.a., d)	0.0	-0.5	-0.9	-1.1	-0.8	-0.5	-0.7	-1.0	-1.1	1.4	-1.1	-1.0
Durable Goods Orders (a)	1.9	-3.5	5.1	-1.7	-2.3	4.1	1.9	-2.9	-0.8	2.8	-0.5	-4.6
Leading Economic Indicators (g)	0.2	-0.2	0.4	0.6	0.6	0.6	0.0	-0.1	0.0	0.6	0.5	-0.3
Balance of Trade & Services (f)	-43.6	-38.6	-52.2	-43.4	-43.5	-46.3	-43.7	-50.5	-44.3	-45.5	-43.6	-44.7
Federal Funds Rate (%)	0.11	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.12	0.12	0.24
3-Mo. Treasury Bill Rate (%)	0.03	0.02	0.03	0.02	0.02	0.02	0.03	0.07	0.02	0.02	0.12	0.23
10-Year Treasury Note Yield (%)	1.88	1.98	2.04	1.94	2.20	2.36	2.32	2.17	2.17	2.07	2.26	2.24

(a) month-over-month % change; (b) millions, saar; (c) month-over-month change, thousands; (d) year-over-year % change; (e) annualized % change; (f) $ billions; (g) level. Most series are subject to frequent government revisions. Use with care.

Calendar Of Upcoming Economic Data Releases

Monday	Tuesday	Wednesday	Thursday	Friday
March 28 Dallas Fed Survey (Mar) Personal Income and Consumption (Feb) International Trade (Feb, Advance) Markit Services PMI (Mar, Flash) Pending Home Sales (Jan)	**29** S&P/Case-Shiller Home Price Index (Jan) Consumer Confidence (Mar, Conference Board)	**30** ADP Employment (Mar) EIA Crude Oil Stocks Mortgage Applications	**31** Chicago PMI (Mar) Weekly Jobless Claims Weekly Money Supply	**April 1** Employment (Mar) Markit Manufacturing PMI (Mar, Final) ISM Manufacturing (Mar) Construction Spending (Feb) Light Vehicle Sales (Mar) Consumer Sentiment (Mar, Final, University Michigan)
4 Factory Orders (Feb)	**5** International Trade (Feb) Markit Services PMI (Mar, Final) ISM Non-Manufacturing (Mar) JOLTS (Feb)	**6** **FOMC Minutes** EIA Crude Oil Stocks Mortgage Applications	**7** Consumer Credit (Feb) Weekly Jobless Claims Weekly Money Supply	**8** Wholesale Trade (Feb)
11	**12** NFIB Survey (Mar) Import Prices (Mar) Federal Budget (Mar)	**13** Retail Sales (Mar) Producer Price Index (Mar) Business Inventories (Feb) Beige Book EIA Crude Oil Stocks Mortgage Applications	**14** Consumer Price Index (Mar) Weekly Jobless Claims Weekly Money Supply	**15** Industrial Production (Mar) Empire State Survey (Apr) Consumer Sentiment (Apr, Preliminary, University of Michigan) TIC Data (Feb)
18 NAHB Survey (Apr)	**19** Housing Starts (Mar)	**20** Existing Home Sales (Mar) EIA Crude Oil Stocks Mortgage Applications	**21** Philadelphia Fed Survey (Apr) FHFA Home Price Survey (Feb) Weekly Jobless Claims Weekly Money Supply	**22** Markit Manufacturing PMI (Apr, Flash)
25 Dallas Fed Survey (Apr New Homes Sales (Mar)	**26** **FOMC Meeting** S&P/Case-Shiller Home Price Index (Feb) Markit Services (Apr, Flash) Richmond Feb Survey (Apr) Durable Goods (Mar) Consumer Confidence (Apr, Conference Board)	**27** **FOMC Meeting** **Statement 2:00 p.m.** International Trade (Mar, Advance) Pending Home Sales (Mar) EIA Crude Oil Stocks Mortgage Applications	**28** Real GDP (Q1, Advance) Kansas City Fed Survey (Apr) Housing Vacancies (Q1) Weekly Jobless Claims Weekly Money Supply	**29** Personal Income and Consumption (Mar) Employment Cost Index (Q1) Chicago PMI (Apr) Consumer Sentiment (Apr, Final, University Michigan)
May 2 Markit Manufacturing PMI (Apr, Final) ISM Manufacturing (Apr) Construction Spending (Mar) Senior Loan Officer Survey (Q2, Tentative)	**3** Light Vehicle Sales (Apr)	**4** ADP Employment (Apr) International Trade (Mar) Markit Services PMI (Apr, Final) ISM Non-Manufacturing (Apr) Factory Orders (Mar) Productivity and Costs (Q1, Preliminary) EIA Crude Oil Stocks Mortgage Applications	**5** Weekly Jobless Claims Weekly Money Supply	**6** Employment (Apr) Consumer Credit (Mar)

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TABLE OF CONTENTS

Ready, Set, Hike

Domestic Commentary All of our panelists responding to our November 24th-25th survey said they believe the Federal Reserve's Open Market Committee (FOMC) will raise interest rates by 25 basis points at its December 15th-16th meeting. Moreover, the market-based probability of a December rate hike now stands at a bit more than 70%. Odds of a December move have jumped in reaction to the FOMC's October 28th policy statement and minutes of the meeting that were generally perceived as hawkish, a stronger than anticipated October Employment report, and recent statements by Fed Chair Janet Yellen and other FOMC members that suggested to analysts and market participants that a rate hike was imminent.

The FOMC's October policy statement dropped the phrase that "recent global and financial developments" posed a risk to U.S. economic activity and inflation "in the near term". More importantly, instead of emphasizing factors that would determine how long to maintain its existing target for the federal funds rate, the October statement listed factors that would help determine whether it was appropriate for the FOMC to raise the funds rate target "at the next meeting". While minutes of the October meeting released on November 18th indicated that "most" members still were not reasonably confident of their inflation outlook, "most" members thought that the conditions to hike rates "could well be met by the next meeting." Public comments by Yellen and other FOMC members since the October meeting have done nothing to dissuade markets from thinking the FOMC is primed to go in December. Indeed, Yellen may deliver an even clearer signal of a December hike during a scheduled speech on December 2nd or at her Congressional testimony on December 3rd.

The October Employment report released on November 6th was a major catalyst in shifting market expectations about a December rate hike. Payrolls and average hourly earnings grew by more than anticipated and the unemployment rate ratcheted down by another 0.1 of a percentage point to 5.0%, its lowest level since April 2008. In the minds of many, the only thing now standing in the way of Fed action at its December meeting is the November Employment Report due out on December 4th. If the report indicates job growth last month on par with recent trends and reported job gains in the prior two months are not downwardly revised by a large degree, announcement of a rate hike on the 16th will likely become a certainty, according to most analysts.

Once lift-off by the FOMC begins in December, the consensus continues to predict that policymakers will move more cautiously than in past tightening cycles, following no "predetermined course". Asked this month by how many basis points the FOMC will raise its federal funds rate target in 2016, the consensus response from our panelists was 95.625 basis points; essentially four 25 basis-point increases spread over the course of next year. Currently, market-based predictors of Fed action, foresee only two quarter-point hikes next year. An average of the ten highest responses from our panelists this month forecast 140 basis points of rate hikes in 2016, while an average of the 10 lowest responses predicted an increase of 57.5 basis points.

Expectations that the FOMC will move more slowly than usual are premised on three primary factors. First, there is the general consensus that potential GDP growth is slower now than in past cycles due to weak labor force and productivity increases. That would suggest a lower long-run level for Fed achievement of a neutral fed funds rate. Second, the Fed will begin normalizing rates at a time when most other major central banks remain extremely accommodative, thus risking further increases in the foreign exchange value of an already-strong U.S. dollar. Third, the FOMC has consistently signaled its intention to move gradually once rate lift-off was initialed. For example, minutes of the FOMC October meeting noted that "participants generally agreed that it would probably be appropriate to remove policy accommodation gradually," and stated that raising interest rates "relatively soon" would allow for the ultimate pace of tightening to be more shallow this cycle than in the past.

Increased anticipation of a Fed rate hike in December is presently being discounted in markets with the sharpest increases occurring in the short end of the Treasury curve. For the most part, however, markets have reacted relatively calmly to the prospect that the Fed is finally poised to begin its normalization of rates, no doubt aided by assurances from the FOMC of its intention to move gradually and current market expectations that economic developments will not force the Fed into a faster-than-expected pace of tightening. Increases in U.S. yields also are expected to be capped by their relative attractiveness compared to elsewhere in the world. Nonetheless, spreads will likely continue to widen over the forecast horizon. The junk market has been under pressure since March of this year and there is no reason to suspect that it won't remain that way as the Fed raises rates over the coming year.

The Bureau of Economic Analysis (BEA) revised up the estimated rate of real GDP growth last quarter to 2.1% (q/q,saar), 0.6 of a percentage point faster than its initial estimate. The revision was entirely accounted for by much less drag from private inventories than originally estimated. Initially, inventories were estimated to have subtracted 1.4 percentage points from real GDP's rate of growth, but now are estimated to have subtracted only 0.6 of a point. Growth in real personal consumption expenditures was revised down to 3.0% (q/q,saar) from 3.2%. Growth in real business fixed investment was revised up to 2.4% (q/q,saar) from 2.1%, but the drag from the trade sector was a bit more than originally thought. Growth in real domestic final sales (GDP minus inventories and trade) was revised down by 0.1 of a percentage point to 2.8%.

The consensus predicts real GDP will grow 2.5% (q/q,saar) in the current quarter, down 0.1 of a percentage point from a month ago. However, recent data suggests even this estimate may be too optimistic. Given data for October and hints of activity in November, the pace of growth in real PCE looks to have softened a good bit this quarter following increases in Q2 and Q3 that averaged 3.3% (q/q,saar). BEA's sharp upward revision to private inventories in Q3 also suggests that we will see more drag from inventories in Q4 than some had been anticipating. Net exports also may take a larger chunk from GDP this quarter than now expected by the consensus. There also is a strong likelihood of seasonal greater weakness in government spending and investment this quarter and next reminiscent of the softness witnessed over the past several years. Real residential investment growth also looks like it may have slowed in Q4 following growth of 7.3% (q/q,saar) in Q3.

In 2016, the consensus this month still forecasts real GDP growth of 2.5% (q/q,saar) in Q1, 2.7% in Q2, and 2.6% in Q3 and Q4. The consensus forecast of growth in Q1 2017 was also unchanged at 2.5%. Consensus forecasts of inflation also underwent minor changes, but in general the vast majority of the panelists continue to believe the Consumer Price Index and GDP price index are poised to rebound in the near-term, accelerating to a 2.0% or slightly above annualized rate by next summer, the increases largely premised on expectations that energy prices are stabilizing and that base effects following last year's plunge in prices will kick in as 2016 begins. Core PCE inflation is expected to accelerate much more gradually over the forecast horizon, probably not reaching 2.0% on a year-over-year basis until late in 2016 or early 2017.

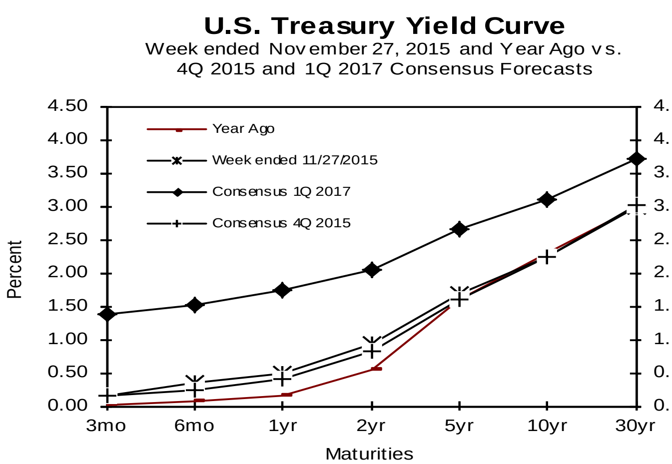
Consensus Forecast A 25 basis point hike in interest rates is expected at the FOMC's December 15th-16th meeting, followed by another 100 basis points of tightening in 2016 *(see page 2)*.

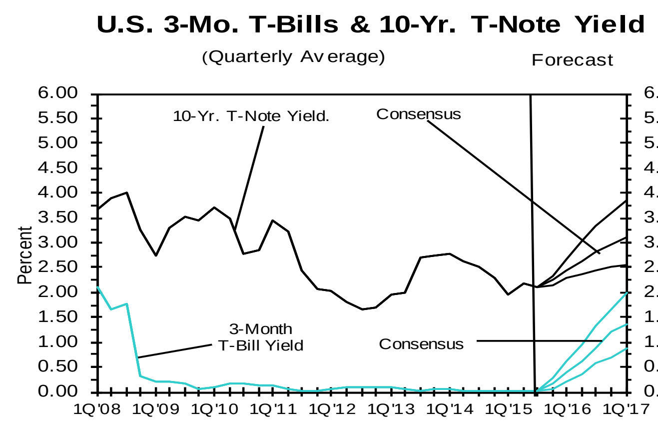
Special Questions On page 14 are results of our twice-yearly, long-range survey with consensus estimates for the years 2017 through 2021 and averages for the 5-year periods 2017-2021 and 2022-2026.

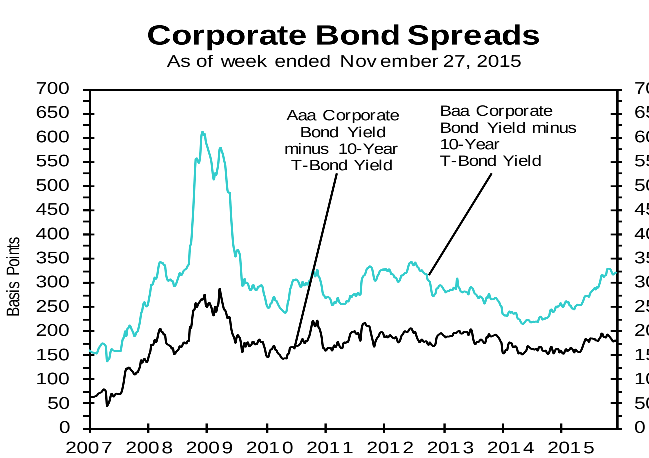
Consensus Forecasts Of U.S. Interest Rates And Key Assumptions[1]

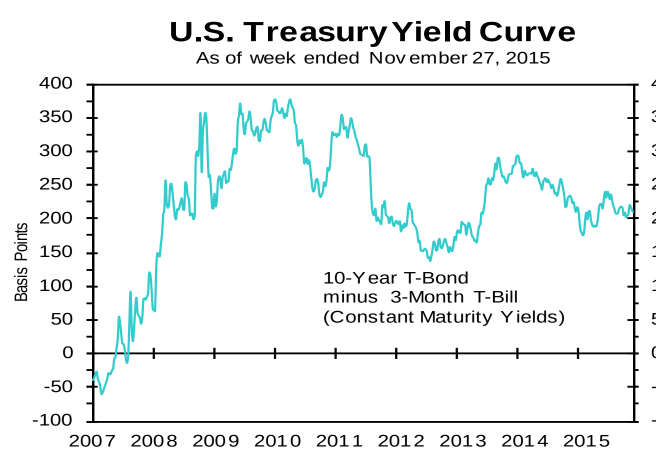
	History								Consensus Forecasts-Quarterly Avg.					
	Average For Week Ending				Average For Month			Latest Q						
Interest Rates	Nov. 27	Nov. 20	Nov. 13	Nov. 6	Oct.	Sep.	Aug.	3Q 2015	4Q 2015	1Q 2016	2Q 2016	3Q 2016	4Q 2016	1Q 2017
Federal Funds Rate	0.12	0.12	0.12	0.10	0.12	0.14	0.14	0.13	**0.2**	**0.5**	**0.7**	**0.9**	**1.2**	**1.4**
Prime Rate	3.25	3.25	3.25	3.25	3.25	3.25	3.25	3.25	**3.3**	**3.5**	**3.7**	**4.0**	**4.2**	**4.5**
LIBOR, 3-mo.	0.39	0.36	0.35	0.35	0.34	0.32	0.32	0.30	**0.4**	**0.7**	**0.9**	**1.2**	**1.4**	**1.7**
Commercial Paper, 1-mo.	0.12	0.10	0.10	0.10	0.11	0.13	0.10	0.08	**0.2**	**0.4**	**0.7**	**1.0**	**1.2**	**1.5**
Treasury bill, 3-mo.	0.14	0.13	0.14	0.06	0.02	0.02	0.07	0.02	**0.1**	**0.4**	**0.6**	**0.9**	**1.1**	**1.4**
Treasury bill, 6-mo.	0.34	0.32	0.34	0.28	0.11	0.18	0.22	0.12	**0.2**	**0.5**	**0.7**	**1.0**	**1.3**	**1.5**
Treasury bill, 1 yr.	0.50	0.49	0.50	0.41	0.26	0.37	0.38	0.29	**0.4**	**0.7**	**1.0**	**1.3**	**1.5**	**1.7**
Treasury note, 2 yr.	0.93	0.90	0.88	0.83	0.64	0.71	0.70	0.63	**0.8**	**1.1**	**1.3**	**1.6**	**1.8**	**2.0**
Treasury note, 5 yr.	1.68	1.68	1.72	1.64	1.39	1.49	1.54	1.47	**1.6**	**1.9**	**2.0**	**2.3**	**2.4**	**2.6**
Treasury note, 10 yr.	2.24	2.26	2.32	2.26	2.07	2.17	2.17	2.11	**2.2**	**2.4**	**2.6**	**2.8**	**3.0**	**3.1**
Treasury note, 30 yr.	3.00	3.03	3.09	3.01	2.89	2.95	2.86	2.84	**3.0**	**3.2**	**3.3**	**3.5**	**3.6**	**3.7**
Corporate Aaa bond	4.03	4.07	4.11	4.05	3.95	4.07	4.04	3.86	**4.0**	**4.2**	**4.4**	**4.6**	**4.8**	**4.9**
Corporate Baa bond	5.45	5.47	5.50	5.43	5.34	5.34	5.19	4.90	**5.3**	**5.4**	**5.5**	**5.7**	**5.8**	**5.9**
State & Local bonds	3.65	3.65	3.74	3.69	3.67	3.78	3.74	3.68	**3.7**	**3.9**	**4.1**	**4.3**	**4.4**	**4.5**
Home mortgage rate	3.95	3.97	3.98	3.87	3.80	3.89	3.91	3.80	**4.0**	**4.2**	**4.4**	**4.6**	**4.7**	**4.9**
	History								Consensus Forecasts-Quarterly					
Key Assumptions	4Q 2013	1Q 2014	2Q 2014	3Q 2014	4Q 2014	1Q 2015	2Q 2015	3Q 2015	4Q 2015	1Q 2016	2Q 2016	3Q 2016	4Q 2016	1Q 2017
Major Currency Index	76.0	77.1	76.6	77.8	82.6	89.4	89.9	91.8	**92.8**	**93.4**	**93.9**	**94.0**	**93.9**	**93.2**
Real GDP	3.8	-0.9	4.6	4.3	2.1	0.6	3.9	2.1	**2.5**	**2.5**	**2.7**	**2.6**	**2.6**	**2.5**
GDP Price Index	1.8	1.5	2.2	1.6	0.1	0.1	2.1	1.3	**1.3**	**1.8**	**2.0**	**2.0**	**2.0**	**2.1**
Consumer Price Index	1.4	2.1	2.4	1.2	-0.9	-3.1	3.0	1.6	**0.8**	**1.7**	**2.3**	**2.2**	**2.4**	**2.2**

Forecasts for interest rates and the Federal Reserve's Major Currency Index represent averages for the quarter. Forecasts for Real GDP, GDP Price Index and Consumer Price Index are seasonally-adjusted annual rates of change (saar). Individual panel members' forecasts are on pages 4 through 9. Historical data for interest rates except LIBOR is from Federal Reserve Release (FRSR) H.15. LIBOR quotes available from *The Wall Street Journal*. Interest rate definitions are same as those in FRSR H.15. Treasury yields are reported on a constant maturity basis. Historical data for Fed's Major Currency Index is from FRSR H.10 and G.5. Historical data for Real GDP and GDP Chained Price Index are from the Bureau of Economic Analysis (BEA). Consumer Price Index (CPI) history is from the Department of Labor's Bureau of Labor Statistics (BLS).









3-Month Interest Rates[1]

	History: Latest	History: Month Ago	History: Year Ago	Consensus Forecasts Months From Now: 3	6	12
U.S.	0.40	0.32	0.48	**0.64**	**0.86**	**1.27**
Japan	0.07	0.08	0.10	**0.12**	**0.12**	**0.12**
U.K.	0.57	0.57	0.75	**0.64**	**0.88**	**1.21**
Switzerland	-0.81	-0.72	0.03	**-0.75**	**-0.70**	**-0.50**
Canada	0.76	0.76	1.22	**0.73**	**0.80**	**1.15**
Australia	2.63	2.35	2.82	**1.90**	**2.00**	**2.50**
Eurozone	-0.10	-0.05	0.15	**-0.08**	**-0.08**	**-0.06**

10-Yr. Government Bond Yields[2]

	History: Latest	History: Month Ago	History: Year Ago	Consensus Forecasts Months From Now: 3	6	12
U.S.	2.33	2.04	2.24	**2.39**	**2.50**	**2.66**
Germany	0.47	0.47	0.70	**0.70**	**0.79**	**1.00**
Japan	0.32	0.31	0.43	**0.41**	**0.48**	**0.82**
U.K.	1.93	1.80	1.92	**2.13**	**2.27**	**2.46**
France	0.85	0.81	1.00	**1.00**	**1.10**	**1.33**
Italy	1.44	1.45	2.07	**1.79**	**1.88**	**2.14**
Switzerland	-0.29	-0.33	0.33	**-0.14**	**-0.02**	**0.23**
Canada	1.59	1.42	1.90	**1.82**	**2.00**	**2.26**
Australia	2.88	2.63	3.11	**2.90**	**3.00**	**3.26**
Spain	1.63	1.59	1.91	**1.72**	**1.80**	**2.03**

Foreign Exchange Rates[1]

	History: Latest	History: Month Ago	History: Year Ago	Consensus Forecasts Months From Now: 3	6	12
U.S.	94.304	92.273	83.009	**94.1**	**94.8**	**95.9**
Japan	122.80	121.20	117.74	**124.8**	**126.3**	**128.6**
U.K.	1.5199	1.5340	1.5672	**1.50**	**1.48**	**1.51**
Switzerland	1.0183	0.9769	0.9696	**1.05**	**1.08**	**1.10**
Canada	1.3337	1.3171	1.1237	**1.34**	**1.35**	**1.32**
Australia	0.7233	0.7215	0.8674	**0.69**	**0.68**	**0.69**
Euro	1.0660	1.1016	1.2394	**1.04**	**1.02**	**1.01**

Consensus 3-Month Rates vs. U.S. Rate

	Now	In 12 Mo.
Japan	-0.33	**-1.15**
U.K.	0.17	**-0.06**
Switzerland	-1.21	**-1.77**
Canada	0.36	**-0.12**
Australia	2.23	**1.23**
Eurozone	-0.50	**-1.33**

Consensus 10-Year Gov't Yields vs. U.S. Yield

	Now	In 12
Germany	-1.76	**-1.66**
Japan	-1.91	**-1.84**
U.K.	-0.30	**-0.20**
France	-1.38	**-1.33**
Italy	-0.79	**-0.52**
Switzerland	-2.52	**-2.43**
Canada	-0.64	**-0.39**
Australia	0.65	**0.60**
Spain	-0.60	**-0.63**

Forecasts of panel members are on pages 10 and 11. Definitions of variables are as follows: [1]Three month rate on interest-earning money market deposits denominated in selected currencies. [2]Government bonds are yields to maturity. Foreign exchange rate forecasts for U.K., Australia and the Euro are U.S. dollars per currency unit. For the U.S dollar, forecasts are of the U.S. Federal Reserve Board's Major Currency Index.

International Commentary The past several weeks have seen global debt and foreign exchange markets discounting an increased likelihood of additional policy easing by the European Central Bank (ECB) on December 3rd followed on December 16th by a Federal Reserve hike in interest rates. The ECB is widely expected to cut its deposit rate by 10 to 20 basis points and increase its total purchases of sovereign debt by an additional 200 to 300 billion euros. The expected divergence in central bank policy has driven the value of the Euro to seven-month lows against the U.S. dollar and pushed shorter-term yields in the Eurozone further into negative territory. While most analysts assume a December easing of policy by the ECB will be its last (no reversal of its easing is expected until late 2017 or early 2018), the anticipated hike by the Fed is expected to be the first in a series that will cumulatively total 100 basis points by the end of 2016.

Real GDP in the Eurozone slowed to a less-than-expected 1.2% (q/q,ar) in Q3 from 1.4% in Q2. Consumer spending remained the major catalyst of growth last quarter, while trade was the biggest drag. Real GDP growth in Germany slowed to 1.3% (q/q,ar) in Q3 from 1.8% in Q2, but growth in France improved to 1.4% from 0.2% in Q2. Spain and Portugal also witnessed slower quarterly growth rates in Q3 than in Q2. More recent data has looked a bit stronger than expected, suggesting some upside to estimates of growth in the current quarter. However, the recent attacks in Paris, the continuing refugee crisis, and mounting political uncertainty in Portugal and Spain pose risks to the outlook. Harmonized consumer price inflation rebounded from -0.1% to +0.1% in October. Inflation excluding energy looks less worrisome, but still remains far short of the ECB's 2.0% target.

The Bank of England's Monetary Policy Committee (MPC) is not expected to hike rates until spring or early summer of next year. Real GDP growth slowed to 2.0% (q/q,ar) in Q3 from 2.8% in Q2, held down by the sharpest widening of the trade deficit since 1997. Output in the services, manufacturing and agricultural sectors each registered growth, but construction output contracted. The unemployment rate has dropped to a seven-year low of 5.3%. Wage growth is moderate, and combined with extremely low inflation, real wage increases remain supportive of consumer spending. Consumer price inflation was -0.1% y/y for a second straight month in October, but core inflation rebounded to 1.1% y/y. The BoE is less concerned than the ECB that the current lack of inflation will turn into persistent deflation.

Central banks in Canada (BoC) and Australia (RBA), whose export-dependent economies have been harder hit by slow global growth and the plunge in commodity prices, are not expected to begin normalizing interest rates until late next year, or early 2017. Real GDP in Canada likely grew 2.0% (q/q,ar) in Q3 on solid consumer spending and a rebound in exports. That would compare with contractions in real GDP of 0.5% in Q2 and 0.8% in Q1. Real GDP growth in Australia during Q3 likely rebounded to something short of 3.0% (q/q,ar) from just 0.7% in Q2. However, recent estimates have been cut due to the report of a record 9.2% plunge in business investment during the quarter, marking the fourth straight decline.

Bank of Japan policy is on indefinite hold. Although the economy slipped back into recession as real GDP fell 0.8% (q/q,ar) in Q3 after declining 0.7% in Q2, and inflation is essentially nonexistent, the economy is at full employment with the jobless rate at its lowest level in 20 years. More QE from the BoJ would likely accomplish little.

The People's Bank of China (PBoC) has cut interest rates six times over the past year and lowered reserve requirements as economic growth decelerated to its slowest pace in a quarter century. Nonetheless, borrowing costs for many firms have remained stubbornly high, including those for banks that are burdened with high levels of non-performing loans. In an attempt to bolster the effectiveness of its policies, the PBoC has adopted a new, more market-oriented benchmark rate and established a corridor for the new rate. However, unless growth stabilizes, pressure will mount on the government to further devalue the yuan *(see pages 10-11 for individual panelists' forecasts).*

Fourth Quarter 2015

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	1 Federal Funds Rate	2 Prime Bank Rate	3 LIBOR Rate 3-Mo.	4 Com. Paper 1-Mo.	5 Treas. Bills 3-Mo.	6 Treas. Bills 6-Mo.	7 Treas. Bills 1-Yr.	8 Treas. Notes 2-Yr.	9 Treas. Notes 5-Yr.	10 Treas. Notes 10-Yr.	11 Treas. Bond 30-Yr.	12 Aaa Corp. Bond	13 Baa Corp. Bond	14 State & Local Bonds	15 Home Mtg. Rate	A. Fed's Major Currency $ Index	B. Real GDP	C. GDP Price Index	D. Cons. Price Index
	Percent Per Annum -- Average For Quarter: Short-Term							Intermediate-Term			Long-Term					Avg. For ---Qtr.---	(Q-Q % Change) (SAAR)		
Scotiabank Group	0.5 H	3.5 H	na	na	0.6 H	na	na	1.2 H	1.8	2.4 H	3.1	na	na	na	na	na	2.5	1.6	0.6
RBC	0.5 H	3.5 H	na	na	0.1	na	na	0.9	1.6	2.2	3.0	na	na	na	na	na	2.4	1.8	0.8
AIG	0.4	na	na	na	0.3	na	na	0.8	na	2.2	na	na	5.2	na	3.9 L	na	2.0	0.8	-0.1
Cycledata Corp.	0.4	3.5 H	0.6 H	0.4	0.2	0.4 H	0.5	0.9	1.6	2.3	3.0	4.0	5.4	3.7	4.0	92.0	2.3	1.6	1.5
Swiss Re	0.4	3.4	0.5	0.2	0.1	0.2	0.4	0.7	1.6	2.3	3.2 H	4.2	5.3	na	4.1 H	na	2.8	0.7	0.3
Nomura Securities, Inc.	0.4	3.4	0.6	0.6 H	na	na	na	1.0	1.8	2.2	2.8 L	4.0	5.4	na	4.0	na	2.2	1.6	0.4
BNP Paribas Americas	0.4	na	0.4	na	na	na	na	0.8	1.6	2.3	na	na	na	na	na	na	1.7 L	na	0.4
Barclays Capital	0.4	3.5 H	0.4	na	na	na	na	1.2 H	1.9 H	2.4 H	3.1	na	na	na	na	na	2.5	1.2	0.3
Bank of America Merrill Lynch	0.3	na	0.5	na	0.3	na	na	0.8	1.6	2.4 H	3.1	na	na	na	na	na	1.9	1.5	0.5
J.P. Morgan Chase	0.3	na	0.6 H	na	na	na	na	0.8	1.6	2.2	3.0	na	na	na	na	na	2.0	1.6	0.6
Societe Generale	0.3	3.3 L	0.5	na	na	na	na	0.7	1.5	2.1 L	2.9	na	na	na	na	na	3.2	1.6	-0.2
Woodworth Holdings	0.3	3.4	0.5	0.2	0.2	0.3	0.4	0.8	1.5	2.3	3.1	4.1	5.4	3.9	4.0	91.0	2.5	0.6	0.7
UBS AG	0.3	na	0.5	na	0.3	na	na	0.8	1.5	2.2	3.0	na	na	na	na	na	3.0	1.6	0.9
Chase Wealth Management	0.3	3.3 L	0.4	0.2	0.2	0.3	0.4	0.7	1.5	2.3	3.0	4.3 H	5.3	3.8	4.0	94.0	2.4	1.5	1.2
High Frequency Economics	0.3	3.4	na	na	0.3	0.4 H	0.4	0.8	1.6	2.3	3.0	na	na	na	na	na	2.7	1.3	1.8
Goldman Sachs & Co.	0.2	na	0.5	na	0.3	na	na	0.8	1.6	2.2	2.9	na	na	na	4.0	na	2.0	1.2	0.8
Wells Capital Management	0.2	3.3 L	0.4	0.2	0.2	0.3	0.6 H	0.9	1.6	2.2	2.9	4.0	5.4	3.7	3.9 L	94.3	2.5	1.4	0.2
BMO Capital Markets	0.2	3.3 L	0.4	na	0.2	0.3	0.5	0.9	1.6	2.3	3.0	na	na	na	4.0	92.6	2.0	1.1	0.5
Standard & Poor's Corp.	0.2	3.3 L	0.4	na	0.2	0.2	0.5	0.9	1.6	2.2	2.9	3.2 L	4.4	na	4.0	93.2	2.9	1.9	2.0
RBS Securities	0.2	3.3 L	0.4	0.2	0.1	0.2	0.4	0.9	1.6	2.2	3.1	4.1	5.3	3.9	4.0	92.0	2.7	1.1	0.8
The Northern Trust Company	0.2	3.3 L	0.4	0.2	0.1	0.2	0.4	0.8	1.6	2.3	3.1	4.1	5.5 H	3.7	3.9 L	na	2.7	0.7	0.9
Daiwa Capital Markets America	0.2	3.3 L	0.4	0.2	0.1	0.3	0.4	0.9	1.6	2.2	3.0	4.2	5.5 H	3.6	3.9 L	94.0	2.0	1.4	1.0
RDQ Economics	0.2	3.3 L	0.4	0.2	0.2	0.4 H	0.4	0.8	1.6	2.3	3.0	4.0	5.3	3.7	3.9 L	92.7	2.5	1.7	1.0
Georgia State University	0.2	3.3 L	na	na	0.1	0.2	0.4	0.8	1.6	2.3	3.1	4.2	5.3	na	4.0	na	2.7	1.4	-0.7 L
Moody's Capital Markets Group	0.2	3.3 L	0.4	0.2	0.1	0.3	0.5	0.8	1.6	2.2	3.0	4.0	5.4	3.6	3.9 L	93.5	2.0	0.8	0.2
Oxford Economics	0.2	3.3 L	na	na	0.1	0.2	0.3	0.7	1.6	2.3	3.1	na	na	na	4.0	93.2	2.2	1.6	0.2
DePrince & Assoc.	0.2	3.3 L	0.4	0.2	0.1	0.2	0.3	0.7	1.4 L	2.1 L	2.9	3.9	5.3	3.7	3.9 L	91.4	2.7	1.6	0.9
PNC Financial Services Corp.	0.2	3.3 L	0.4	na	0.2	0.3	0.4	0.9	1.7	2.3	3.0	na	5.4	3.7	3.9 L	92.2	2.8	0.7	1.2
GLC Financial Economics	0.2	3.3 L	0.4	0.2	0.1	0.2	0.3	0.7	1.5	2.1 L	na	4.0	5.4	3.7	3.9 L	90.7 L	2.7	1.8	2.3 H
Stone Harbor Investment Partners	0.2	3.3 L	0.3 L	0.2	0.1	0.2	0.4	0.9	1.7	2.3	3.0	4.1	4.9	na	3.9 L	92.0	1.7 L	1.9	0.5
Action Economics	0.2	3.3 L	0.3 L	0.1	0.2	0.3	0.4	0.9	1.6	2.3	3.0	4.1	5.5 H	3.9	4.0	na	2.5	0.8	0.7
MacroFin Analytics	0.2	3.3 L	0.4	0.2	0.1	0.3	0.4	0.8	1.7	2.3	3.0	4.0	5.4	3.7	4.0	93.5	2.2	0.9	0.8
SunTrust Banks	0.2	3.3 L	0.5	0.1 L	0.1	0.3	0.4	0.9	1.6	2.2	3.0	4.1	5.5 H	3.9	4.0	na	3.3	1.3	1.0
Moody's Analytics	0.2	3.3 L	0.5	0.1 L	0.1	0.2	0.3	0.6 L	1.4 L	2.3	3.0	3.9	5.2	3.3 L	4.0	na	2.9	-0.3 L	1.1
RidgeWorth Investments	0.2	3.3 L	0.4	0.2	0.0 L	0.2	0.3	0.9	1.7	2.3	3.1	4.2	5.5 H	3.8	4.0	91.7	2.7	1.5	2.0
Mesirow Financial	0.2	3.3 L	0.4	0.2	0.1	0.2	0.4	0.7	1.5	2.2	3.0	4.1	5.4	3.7	3.9 L	93.0	2.5	0.8	0.2
Amherst Pierpont Securities	0.2	3.3 L	0.4	0.2	0.1	0.3	0.4	0.9	1.7	2.2	3.0	4.1	5.5 H	3.7	3.9 L	93.5	1.9	1.6	0.6
Naroff Economic Advisors	0.2	3.3 L	0.4	0.2	0.1	0.3	0.4	0.8	1.5	2.2	3.0	4.1	5.4	3.7	4.0	93.0	3.5	1.9	0.8
MUFG Union Bank	0.2	3.3 L	0.3 L	0.2	0.1	0.3	0.4	0.8	1.6	2.3	3.1	4.1	5.4	3.7	4.0	92.0	2.7	2.2 H	1.3
Nat'l Assn. of Realtors	0.2	3.3 L	0.4	0.3	0.2	0.3	0.6 H	0.9	1.6	2.2	3.0	4.1	5.3	4.1 H	3.9 L	na	2.0	1.6	1.5
Economist Intelligence Unit	0.2	3.3 L	0.4	0.2	0.1	0.2	0.4	0.8	1.6	2.2	2.9	na	na	na	3.9 L	na	2.4	na	1.8
Chmura Economics & Analytics	0.2	3.3 L	0.4	0.1 L	0.1	0.3	0.4	0.8	1.6	2.3	3.1	4.1	na	na	4.0	92.8	3.6 H	1.3	2.2
Comerica Bank	0.1 L	3.3 L	0.4	na	0.1	0.3	0.4	0.8	1.6	2.2	3.0	na	3.8 L	na	3.9 L	na	2.5	1.7	1.5
Fannie Mae	0.1 L	3.3 L	na	na	0.1	0.3	0.4	0.8	1.6	2.2	3.0	na	na	na	na	na	2.6	1.2	0.4
Loomis, Sayles & Company	0.1 L	3.3 L	0.3 L	0.1 L	0.1	0.2	0.4	0.8	1.6	2.2	3.0	4.1	5.4	3.8	3.9 L	92.7	2.3	0.7	0.6
Regions Financial Corporation	0.1 L	3.3 L	0.4	0.1 L	0.1	0.2	0.4	0.7	1.5	2.2	3.0	4.0	5.4	na	3.9 L	93.1	1.9	2.0	0.8
Wells Fargo	0.1 L	3.3 L	0.3 L	0.1 L	0.1	0.1 L	0.2 L	0.8	1.6	2.2	3.0	4.0	5.4	3.9	4.0	94.8 H	2.1	1.4	0.8
December Consensus	**0.2**	**3.3**	**0.4**	**0.2**	**0.1**	**0.2**	**0.4**	**0.8**	**1.6**	**2.2**	**3.0**	**4.0**	**5.3**	**3.7**	**4.0**	**92.8**	**2.5**	**1.3**	**0.8**
Top 10 Avg.	0.4	3.4	0.5	0.3	0.3	0.3	0.5	1.0	1.7	2.3	3.1	4.1	5.5	3.9	4.0	93.7	3.1	1.9	1.8
Bottom 10 Avg.	0.1	3.3	0.3	0.1	0.1	0.2	0.3	0.7	1.5	2.2	2.9	3.9	5.0	3.6	3.9	91.8	1.9	0.6	0.1
November Consensus	0.2	3.3	0.4	0.2	0.1	0.2	0.4	0.7	1.5	2.2	2.9	4.0	5.2	3.7	3.9	91.7	2.6	1.4	1.0
Number of Forecasts Changed From A Month Ago:																			
Down	9	4	11	9	7	6	8	7	4	5	6	5	7	9	6	3	21	15	18
Same	19	27	12	9	10	6	5	10	12	14	13	6	6	7	10	7	17	22	19
Up	19	9	16	11	24	24	23	30	30	28	25	19	19	9	20	16	9	8	10
Diffusion Index	61 %	56 %	56 %	53 %	71 %	75 %	71 %	74 %	78 %	74 %	72 %	73 %	69 %	50 %	69 %	75 %	37 %	42 %	41 %

First Quarter 2016

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	Percent Per Annum -- Average For Quarter: Short-Term							Intermediate-Term			Long-Term					Avg. For Qtr.	(Q-Q % Change) (SAAR)		
	1 Federal Funds Rate	2 Prime Bank Rate	3 LIBOR Rate 3-Mo.	4 Com. Paper 1-Mo.	5 Treas. Bills 3-Mo.	6 Treas. Bills 6-Mo.	7 Treas. Bills 1-Yr.	8 Treas. Notes 2-Yr.	9 Treas. Notes 5-Yr.	10 Treas. Notes 10-Yr.	11 Treas. Bond 30-Yr.	12 Aaa Corp. Bond	13 Baa Corp. Bond	14 State & Local Bonds	15 Home Mtg. Rate	A. Fed's Major Currency $ Index	B. Real GDP	C. GDP Price Index	D. Cons. Price Index
Swiss Re	0.9 H	3.9 H	1.0 H	0.7	0.6	0.7	0.8	1.1	2.1	2.6	3.5	4.4	5.4	na	4.5	na	3.0	0.5 L	0.5
RBC	0.8	3.8	na	na	0.3	na	na	1.2	2.0	2.6	3.3	na	na	na	na	na	2.5	3.1 H	1.3
Scotiabank Group	0.8	3.8	na	na	0.9 H	na	na	1.6	2.2	2.6	3.2	na	na	na	na	na	2.6	1.8	1.4
BNP Paribas Americas	0.7	na	0.9	na	na	na	na	1.6	2.2	2.6	na	na	na	na	na	na	2.0	na	0.9
J.P. Morgan Chase	0.6	na	0.7	na	na	na	na	1.0	1.9	2.4	3.1	na	na	na	na	na	2.3	1.8	1.5
Barclays Capital	0.6	3.8	0.8	na	na	na	na	1.3	2.0	2.4	3.1	na	na	na	na	na	2.5	1.3	0.4 L
Cycledata Corp.	0.6	3.8	0.8	0.6	0.4	0.5	0.7	1.0	1.7	2.4	3.1	4.1	5.5	3.7	4.1	92.0	2.3	1.8	1.8
RDQ	0.6	3.6	0.8	0.7 H	0.6	0.7	0.9	1.2	2.0	2.7	3.3	4.3	5.6	4.1	4.3	96.1 H	2.6	1.9	2.1
Chmura Economics & Analytics	0.6	3.6	0.8	0.6	0.5	0.7	0.9	1.4	2.4	2.9 H	3.6 H	4.6 H	na	na	4.5	91.4	2.7	1.4	1.6
SunTrust Banks	0.6	3.6	0.8	0.3 L	0.5	0.5	0.7	1.2	1.9	2.3	3.1	4.3	5.6	4.0	4.2	na	3.0	1.4	1.2
Societe Generale	0.5	3.5	0.8	na	na	na	na	0.8 L	1.6 L	2.3	3.0	na	na	na	na	na	2.9	1.9	1.4
UBS AG	0.5	na	0.9	na	0.7 H	na	na	1.1	1.8	2.4	3.1	na	na	na	na	na	2.9	2.3	0.9
Nomura Securities, Inc.	0.5	3.5	0.7	0.7	na	na	na	1.1	1.9	2.3	2.9 L	4.1	5.6	na	4.2	na	2.2	1.6	1.1
Goldman Sachs & Co.	0.5	na	0.8	na	0.6	na	na	1.1	2.0	2.4	3.1	na	na	na	4.1	na	2.3	1.6	1.5
Chase Wealth Management	0.5	3.5	0.6	0.4	0.4	0.5	0.6	0.9	1.7	2.5	3.2	4.5	5.5	4.0	4.2	94.2	2.0	1.7	1.6
Nat'l Assn. of Realtors	0.5	3.6	0.7	0.6	0.5	0.7	0.9	1.3	1.8	2.4	3.2	4.2	5.4	4.3 H	4.1	na	2.5	1.9	2.3
High Frequency Economics	0.5	3.6	na	na	0.6	0.7	0.8	1.2	1.9	2.6	3.3	na	na	na	na	na	2.3	2.0	2.3
Wells Capital Management	0.5	3.6	0.7	0.5	0.5	0.8 H	1.1 H	1.4	1.9	2.4	2.9 L	4.1	5.4	3.7	4.1	94.6	2.6	1.7	1.7
BMO Capital Markets	0.5	3.6	0.7	na	0.4	0.6	0.7	1.1	1.9	2.4	3.2	na	na	na	4.1	94.4	2.8	1.5	1.5
Standard & Poor's Corp.	0.5	3.5	0.7	na	0.4	0.4	0.8	1.0	1.6 L	2.2	2.9 L	3.4 L	4.4	na	4.1	93.1	2.4	2.5	2.8
Stone Harbor Investment Partners	0.5	3.5	0.6	0.5	0.5	0.6	0.9	1.3	2.0	2.7	3.3	4.2	4.9	na	4.1	94.0	1.5 L	1.5	1.6
RBS Securities	0.5	3.6	0.6	0.5	0.4	0.5	0.8	1.3	2.0	2.5	3.4	4.3	5.4	4.0	4.2	93.0	2.0	1.5	1.7
DePrince & Assoc.	0.4	3.4	0.7	0.5	0.3	0.5	0.7	1.1	1.6 L	2.3	3.1	4.1	5.3	3.9	4.1	91.6	2.6	2.0	2.0
Regions Financial Corporation	0.4	3.4	0.5	0.5	0.2	0.4	0.6	0.9	1.7	2.4	3.2	4.3	5.6	na	4.0	94.2	2.7	1.6	1.5
Amherst Pierpont Securities	0.4	3.5	0.9	0.5	0.4	0.6	1.0	1.3	2.2	2.7	3.5	4.6	6.1 H	4.2	4.4	95.0	2.3	2.2	2.2
Woodworth Holdings	0.4	3.6	0.6	0.4	0.4	0.4	0.6	0.9	1.7	2.4	3.2	4.3	5.5	4.0	4.1	91.5	2.0	0.6	0.9
AIG	0.4	na	na	na	0.3	na	na	0.8 L	na	2.2 L	na	na	5.2	na	3.9	na	2.3	1.6	1.3
Moody's Capital Markets Group	0.4	3.4	0.6	0.3 L	0.5	0.6	0.8	1.0	1.8	2.4	3.1	4.1	5.6	3.7	4.1	94.3	2.2	1.5	1.5
Wells Fargo	0.4	3.4	0.6	0.4	0.3	0.4	0.5 L	0.9	1.7	2.3	3.0	4.1	5.5	4.0	4.1	96.0	1.9	1.5	1.7
The Northern Trust Company	0.4	3.4	0.5	0.4	0.2	0.4	0.5 L	1.0	1.9	2.4	3.2	4.1	5.5	3.8	4.0	na	2.8	1.6	1.7
Daiwa Capital Markets America	0.4	3.4	0.6	0.3 L	0.3	0.5	0.6	1.0	1.7	2.3	3.1	4.2	5.5	3.7	4.0	95.0	2.7	1.8	1.9
PNC Financial Services Corp.	0.4	3.6	0.7	na	0.5	0.5	0.7	1.1	1.9	2.5	3.1	na	5.4	3.7	4.0	92.0	2.5	1.6	2.0
MUFG Union Bank	0.4	3.5	0.5	0.5	0.3	0.4	0.5 L	1.8 H	2.5 H	2.9 H	3.5	4.3	5.5	3.8	4.7 H	93.0	2.9	2.6	3.0 H
GLC Financial Economics	0.4	3.4	0.5	0.3 L	0.2	0.3 L	0.5 L	0.8 L	1.7	2.3	na	4.2	5.6	3.8	4.1	90.5 L	3.2	1.9	2.6
MacroFin Analytics	0.4	3.5	0.6	0.4	0.3	0.4	0.5 L	1.0	1.8	2.4	3.2	4.2	5.6	4.0	4.2	94.3	2.5	1.5	1.5
Loomis, Sayles & Company	0.4	3.4	0.6	0.5	0.4	0.5	0.6	1.0	1.8	2.3	3.0	4.0	5.2	3.8	3.9 L	93.3	2.6	1.5	1.8
Georgia State University	0.4	3.4	na	na	0.3	0.4	0.5 L	0.9	1.7	2.5	3.2	4.2	5.3	na	4.4	na	2.7	2.6	1.8
Oxford Economics	0.4	3.4	na	na	0.3	0.3 L	0.6	1.0	1.6 L	2.4	3.1	na	na	na	4.1	94.0	2.8	2.1	1.8
Action Economics	0.4	3.6	0.4 L	0.4	0.4	0.5	0.6	1.0	1.7	2.5	3.2	4.4	5.7	4.0	4.3	na	2.4	2.0	2.1
Moody's Analytics	0.3 L	3.3 L	0.8	0.3 L	0.2	0.3 L	0.6	0.9	1.7	2.6	3.2	4.2	5.6	3.5 L	4.2	na	3.4 H	1.9	2.0
Bank of America Merrill Lynch	0.3 L	na	0.7	na	0.3	na	na	1.0	1.9	2.5	3.2	na	na	na	na	na	2.7	1.6	1.0
Mesirow Financial	0.3 L	3.3 L	0.6	0.3 L	0.2	0.4	0.5 L	0.9	1.6 L	2.3	3.1	4.6	5.4	4.0	3.9	92.7	2.6	1.4	1.2
Naroff Economic Advisors	0.3 L	3.3 L	0.5	0.4	0.3	0.5	0.7	1.1	1.9	2.5	3.3	4.4	5.6	4.2	4.4	92.5	2.6	2.2	2.0
Economist Intelligence Unit	0.3 L	3.3 L	0.9	0.3 L	0.2	0.5	0.7	1.1	1.8	2.5	3.1	na	na	na	4.1	na	2.8	na	2.1
Comerica Bank	0.3 L	3.3 L	0.5	na	0.2	0.4	0.5 L	0.9	1.7	2.3	3.1	na	3.8 L	na	4.0	na	2.7	1.7	2.2
Fannie Mae	0.3 L	3.3 L	na	na	0.5	0.6	0.7	1.1	1.8	2.3	3.0	na	na	na	4.0	na	2.4	1.6	1.9
RidgeWorth Investments	0.3 L	3.3 L	0.5	0.3 L	0.1 L	0.3 L	0.5 L	1.0	2.0	2.6	3.4	4.4	5.6	4.2	4.3	93.0	2.7	2.0	2.4
December Consensus	**0.5**	**3.5**	**0.7**	**0.4**	**0.4**	**0.5**	**0.7**	**1.1**	**1.9**	**2.4**	**3.2**	**4.2**	**5.4**	**3.9**	**4.2**	**93.4**	**2.5**	**1.8**	**1.7**
Top 10 Avg.	0.7	3.7	0.9	0.6	0.6	0.7	0.9	1.4	2.1	2.7	3.4	4.4	5.6	4.1	4.4	94.8	3.0	2.4	2.4
Bottom 10 Avg.	0.3	3.3	0.5	0.3	0.2	0.3	0.5	0.9	1.6	2.3	3.0	4.0	5.0	3.7	4.0	92.0	2.0	1.3	0.9
November Consensus	0.4	3.5	0.6	0.4	0.3	0.4	0.6	1.0	1.8	2.4	3.1	4.2	5.3	3.9	4.1	91.9	2.5	1.8	1.9
Number of Forecasts Changed From A Month Ago:																			
Down	3	4	7	5	5	2	7	4	5	7	7	5	4	6	8	1	12	16	22
Same	29	24	22	15	20	16	11	16	12	14	14	10	8	6	12	8	26	23	20
Up	15	13	10	9	17	18	18	27	29	26	23	15	20	11	18	16	9	6	5
Diffusion Index	63 %	61 %	54 %	57 %	64 %	72 %	65 %	74 %	76 %	70 %	68 %	67 %	75 %	61 %	63 %	80 %	47 %	39 %	32 %

Second Quarter 2016

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	Percent Per Annum -- Average For Quarter: Short-Term: 1 Federal Funds Rate	2 Prime Bank Rate	3 LIBOR Rate 3-Mo.	4 Com. Paper 1-Mo.	5 Treas. Bills 3-Mo.	6 Treas. Bills 6-Mo.	7 Treas. Bills 1-Yr.	Intermediate-Term: 8 Treas. Notes 2-Yr.	9 Treas. Notes 5-Yr.	10 Treas. Notes 10-Yr.	Long-Term: 11 Treas. Bond 30-Yr.	12 Aaa Corp. Bond	13 Baa Corp. Bond	14 State & Local Bonds	15 Home Mtg. Rate	Avg. For Qtr.: A. Fed's Major Currency $ Index	(Q-Q % Change) (SAAR): B. Real GDP	C. GDP Price Index	D. Cons. Price Index
Swiss Re	1.4 H	4.4 H	1.5 H	1.2 H	1.1	1.2 H	1.4	1.7	2.5	2.8	3.7	4.6	5.6	na	4.7	na	3.2	2.3	3.3
Chmura Economics & Analytics	1.2	4.2	1.4	1.2 H	1.0	1.2 H	1.5	2.0 H	3.1 H	3.5 H	4.2 H	5.2 H	na	na	5.1 H	89.3 L	3.1	1.5	2.3
Scotiabank Group	1.0	4.0	na	na	1.2 H	na	na	2.0 H	2.3	2.7	3.3	na	na	na	na	na	2.6	1.8	1.4
RBC	1.0	4.0	na	na	0.6	na	na	1.4	2.1	2.7	3.4	na	na	na	na	na	3.2	2.1	3.4
RDQ Economics	0.9	3.9	1.2	1.0	1.0	1.2 H	1.4	1.5	2.4	3.3	3.9	4.8	6.0	4.8 H	4.8	99.6 H	2.8	2.0	2.1
J.P. Morgan Chase	0.9	na	0.9	na	na	na	na	1.2	2.0	2.4	3.2	na	na	na	na	na	2.3	1.9	2.2
High Frequency Economics	0.9	4.0	na	na	1.0	1.1	1.3	1.6	2.3	2.9	3.5	na	na	na	na	na	2.5	2.1	2.4
BNP Paribas Americas	0.9	na	1.1	na	na	na	na	1.9	2.4	2.8	na	na	na	na	na	na	1.8 L	na	3.0
Amherst Pierpont Securities	0.9	4.0	1.4	0.9	0.9	1.2 H	1.6 H	1.8	2.7	3.2	4.0	5.2 H	6.7 H	4.7	5.0	96.5	2.9	2.0	2.8
Cycledata Corp.	0.8	4.0	1.0	0.8	0.6	0.7	0.9	1.2	1.8	2.5	3.2	4.2	5.5	3.8	4.2	92.0	2.3	1.8	2.1
DePrince & Associates	0.8	3.8	1.1	0.9	0.7	0.9	1.2	1.5	1.9	2.6	3.3	4.3	5.4	4.1	4.3	92.7	2.7	2.0	2.2
Societe Generale	0.8	3.8	1.0	na	na	na	na	1.0	1.8	2.5	3.1	na	na	na	na	na	2.8	2.1	2.4
Wells Capital Management	0.8	3.9	1.0	0.8	0.9	1.2 H	1.5	1.8	2.2	2.5	2.9 L	4.1	5.5	3.8	4.2	95.1	2.7	1.9	1.7
UBS AG	0.8	na	1.3	na	1.0	na	na	1.4	2.0	2.4	3.1	na	na	na	na	na	2.8	2.3	0.9 L
Goldman Sachs & Co.	0.8	na	1.0	na	0.8	na	na	1.2	2.2	2.7	3.2	na	na	na	4.3	na	2.3	1.9	2.2
Nat'l Assn. of Realtors	0.8	3.8	1.0	0.9	0.8	0.9	1.3	1.6	2.2	2.5	3.3	4.3	5.6	4.5	4.4	na	2.7	2.0	2.5
BMO Capital Markets	0.7	3.8	0.9	na	0.7	0.9	1.0	1.3	2.0	2.5	3.2	na	na	na	4.2	94.9	2.6	2.4	2.7
Standard & Poor's Corp.	0.7	3.6	0.9	na	0.6	0.7	1.2	1.3	1.8	2.4	3.0	3.6 L	4.5	na	4.2	93.0	2.8	2.6	3.2
Stone Harbor Investment Partners	0.7	3.7	0.9	0.7	0.7	0.8	1.1	1.5	2.2	2.8	3.4	4.3	5.0	na	4.2	95.0	3.2	1.7	1.9
RBS Securities	0.7	3.8	0.9	0.7	0.7	0.9	1.2	1.7	2.2	2.8	3.5	4.6	5.6	4.1	4.5	94.0	2.7	2.0	3.3
Moody's Analytics	0.7	3.7	1.0	0.6	0.4	0.6	0.7	1.0	1.9	2.8	3.4	4.4	5.9	3.7 L	4.5	na	3.2	1.9	2.5
Woodworth Holdings	0.7	3.8	0.9	0.6	0.6	0.7	0.8	1.2	2.0	2.7	3.5	4.6	5.7	4.3	4.4	92.0	2.0	0.7 L	0.9 L
SunTrust Banks	0.7	3.7	1.0	0.6	0.6	0.7	0.9	1.3	2.0	2.4	3.1	4.3	5.6	4.1	4.5	na	1.8 L	1.5	1.4
PNC Financial Services Corp.	0.7	3.8	1.0	na	0.8	0.8	1.0	1.4	2.0	2.5	3.2	na	5.4	3.7 L	4.1	92.1	2.4	1.6	2.0
MUFG Union Bank	0.7	3.8	0.8	0.8	0.6	0.6	0.8	2.0 H	2.7	3.2	3.7	4.4	5.7	3.9	4.8	92.0	2.9	2.9 H	3.6 H
Nomura Securities, Inc.	0.6	3.6	0.8	0.8	na	na	na	1.2	1.9	2.4	3.0	4.2	5.7	na	4.3	na	2.3	1.6	2.3
Georgia State University	0.6	3.4	na	na	0.4	0.5	0.5 L	1.0	1.7 L	2.6	3.2	4.3	5.3	na	4.6	na	2.7	1.8	2.4
Barclays Capital	0.6	3.8	0.8	na	na	na	na	1.4	2.1	2.5	3.2	na	na	na	na	na	2.5	2.2	2.3
MacroFin Analytics	0.6	3.7	0.8	0.6	0.5	0.6	0.7	1.2	1.9	2.6	3.4	4.4	5.8	4.2	4.4	94.7	2.7	1.6	1.8
Wells Fargo	0.6	3.6	0.8	0.7	0.6	0.7	0.8	1.1	1.8	2.4	3.0	4.2	5.6	4.0	4.2	97.3	2.6	1.9	2.2
Action Economics	0.6	3.8	0.4 L	0.6	0.5	0.6	0.8	1.1	1.8	2.5	3.3	4.5	5.8	4.1	4.3	na	2.8	2.4	2.2
Economist Intelligence Unit	0.6	3.6	1.2	0.8	0.4	0.9	1.0	1.5	2.0	2.8	3.4	na	na	na	4.3	na	2.1	na	2.2
GLC Financial Economics	0.6	3.6	0.8	0.6	0.5	0.6	0.7	1.1	2.0	2.6	na	4.6	5.9	4.1	4.4	90.6	3.3	2.0	2.7
Bank of America Merrill Lynch	0.6	na	0.8	na	0.5	na	na	1.2	2.0	2.6	3.3	na	na	na	na	na	2.5	1.9	2.6
Moody's Capital Markets Group	0.6	3.6	0.8	0.4 L	0.6	0.8	1.0	1.2	2.0	2.5	3.2	4.2	5.6	3.8	4.2	94.6	2.5	1.7	1.5
Naroff Economic Advisors	0.6	3.6	0.8	0.7	0.6	0.8	1.0	1.4	2.2	3.0	3.7	4.8	5.9	4.6	4.8	91.4	4.2 H	2.6	2.1
Comerica Bank	0.5	3.5	0.8	na	0.4	0.5	0.6	1.1	1.8	2.4	3.1	na	4.0 L	na	4.1	na	2.7	1.8	2.0
Regions Financial Corporation	0.5	3.5	0.7	0.6	0.4	0.5	0.7	1.1	1.8	2.5	3.3	4.4	5.7	na	4.1	96.2	2.5	2.1	2.1
Fannie Mae	0.5	3.5	na	na	0.6	0.7	0.9	1.3	1.9	2.4	3.1	na	na	na	4.1	na	2.4	2.0	2.5
Chase Wealth Management	0.5	3.5	0.6	0.4 L	0.4	0.5	0.6	0.9 L	1.7 L	2.5	3.2	4.5	5.5	4.0	4.2	94.4	2.5	1.8	1.9
Daiwa Capital Markets America	0.5	3.5	0.8	0.6	0.5	0.7	0.9	1.2	1.8	2.4	3.2	4.2	5.6	3.8	4.2	96.0	2.4	2.0	2.0
RidgeWorth Investments	0.5	3.5	0.8	0.6	0.4	0.5	0.7	1.3	2.2	2.9	3.6	4.5	5.7	4.3	4.6	93.0	2.7	2.0	2.4
Loomis, Sayles & Company	0.5	3.5	0.8	0.6	0.5	0.7	0.8	1.2	1.8	2.4	3.1	4.1	5.2	3.7 L	4.1	93.8	2.4	2.4	2.6
The Northern Trust Company	0.5	3.5	0.6	0.5	0.3 L	0.5	0.6	1.1	2.0	2.5	3.3	4.1	5.4	3.8	4.1	na	2.7	1.6	1.7
Oxford Economics	0.4 L	3.5	na	na	0.3 L	0.4 L	0.8	1.1	1.7 L	2.4	3.2	na	na	na	4.2	94.5	3.3	1.5	2.3
AIG	0.4 L	na	na	na	0.4	na	na	0.9 L	na	2.3 L	na	na	5.1	na	4.0 L	na	2.5	1.9	2.4
Mesirow Financial	0.4 L	3.4 L	0.6	0.4 L	0.3 L	0.5	0.8	1.2	1.9	2.6	3.4	4.1	5.5	4.3	4.2	92.8	2.3	2.2	2.7
December Consensus	**0.7**	**3.7**	**0.9**	**0.7**	**0.6**	**0.7**	**1.0**	**1.3**	**2.0**	**2.6**	**3.3**	**4.4**	**5.5**	**4.1**	**4.4**	**93.9**	**2.7**	**2.0**	**2.3**
Top 10 Avg.	1.0	4.0	1.2	0.9	1.0	1.1	1.3	1.8	2.5	3.0	3.7	4.7	5.9	4.4	4.7	96.0	3.3	2.4	3.1
Bottom 10 Avg.	0.5	3.5	0.7	0.5	0.4	0.5	0.7	1.0	1.8	2.4	3.0	4.1	5.1	3.8	4.1	91.8	2.2	1.5	1.5
November Consensus	0.6	3.7	0.9	0.7	0.6	0.7	0.9	1.3	2.0	2.6	3.3	4.4	5.4	4.1	4.3	92.3	2.7	1.9	2.3
Number of Forecasts Changed From A Month Ago:																			
Down	6	6	9	7	8	5	5	10	9	10	9	4	3	6	8	1	12	10	7
Same	29	24	21	13	23	16	15	17	15	14	18	13	6	9	11	10	28	25	27
Up	12	11	8	8	11	15	16	20	22	23	17	13	22	9	19	13	7	10	13
Diffusion Index	56 %	56 %	49 %	52 %	54 %	64 %	65 %	61 %	64 %	64 %	59 %	65 %	81 %	56 %	64 %	75 %	45 %	50 %	56 %

Third Quarter 2016

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	Percent Per Annum -- Average For Quarter: Short-Term							Intermediate-Term			Long-Term					Avg. For Qtr.	(Q-Q % Change) (SAAR)		
	1 Federal Funds Rate	2 Prime Bank Rate	3 LIBOR Rate 3-Mo.	4 Com. Paper 1-Mo.	5 Treas. Bills 3-Mo.	6 Treas. Bills 6-Mo.	7 Treas. Bills 1-Yr.	8 Treas. Notes 2-Yr.	9 Treas. Notes 5-Yr.	10 Treas. Notes 10-Yr.	11 Treas. Bond 30-Yr.	12 Aaa Corp. Bond	13 Baa Corp. Bond	14 State & Local Bonds	15 Home Mtg. Rate	A. Fed's Major Currency $ Index	B. Real GDP	C. GDP Price Index	D. Cons. Price Index
Chmura Economics & Analytics	1.8 H	4.8 H	2.0 H	1.8 H	1.5 H	1.8 H	2.1 H	2.6 H	3.7 H	4.0 H	4.7 H	5.6	na	na	5.6 H	87.4 L	3.2	1.7	2.0
Swiss Re	1.6	4.6	1.7	1.4	1.3	1.4	1.8	2.1	2.8	3.0	3.9	4.7	5.7	na	4.9	na	3.2	1.4	2.4
Amherst Pierpont Securities	1.3	4.5	1.9	1.4	1.4	1.7	2.1 H	2.4	3.3	3.7	4.5	5.7 H	7.1 H	5.2 H	5.4	97.5	2.8	2.2	2.9
Scotiabank Group	1.3	4.3	na	na	1.4	na	na	2.3	2.5	2.8	3.3	na	na	na	na	na	2.7	2.0	1.8
High Frequency Economics	1.3	4.4	na	na	1.4	1.4	1.8	2.0	2.6	3.2	3.7	na	na	na	na	na	2.5	2.2	2.5
RBC	1.3	4.3	na	na	0.7	na	na	1.6	2.3	2.8	3.4	na	na	na	na	na	3.2	2.5	2.8
RDQ Economics	1.2	4.2	1.6	1.3	1.4	1.6	1.8	1.9	2.7	3.4	3.9	4.9	5.9	4.7	4.9	102.5 H	2.8	2.1	2.2
GLC Financial Economics	1.2	4.2	1.4	1.2	1.1	1.2	1.3	1.6	2.5	3.1	na	5.2	6.5	4.6	5.2	90.1	3.5 H	2.5 H	2.8
DePrince & Associates	1.2	4.2	1.5	1.3	1.1	1.3	1.6	1.9	2.2	2.8	3.5	4.6	5.6	4.3	4.6	92.5	2.8	2.1	2.3
BNP Paribas Americas	1.2	na	1.3	na	na	na	na	2.0	2.4	2.8	na	na	na	na	na	na	2.0	na	2.9
J.P. Morgan Chase	1.1	na	1.2	na	na	na	na	1.3	2.0	2.5	3.2	na	na	na	na	na	2.3	1.9	2.2
Wells Capital Management	1.0	4.2	1.2	1.1	1.1	1.4	1.7	2.0	2.3	2.6	3.0 L	4.3	5.6	3.8	4.3	95.3	2.8	2.1	1.8
Cycledata Corp.	1.0	4.2	1.2	1.1	1.0	1.1	1.3	1.6	2.2	2.8	3.5	4.6	5.7	4.2	4.4	92.0	2.3	2.0	2.2
Goldman Sachs & Co.	1.0	na	1.3	na	1.1	na	na	1.5	2.3	2.9	3.3	na	na	na	4.5	na	2.3	2.0	2.4
Nat'l Assn. of Realtors	1.0	4.0	1.3	1.2	1.1	1.3	1.6	1.9	2.5	2.8	3.5	4.6	5.8	4.6	4.6	na	2.7	2.1	2.5
UBS AG	1.0	na	1.5	na	1.3	na	na	1.7	2.2	2.5	3.1	na	na	na	na	na	2.7	2.3	3.0
BMO Capital Markets	1.0	4.1	1.2	na	0.9	1.1	1.5	1.5	2.2	2.6	3.3	na	na	na	4.3	95.0	2.5	2.2	2.5
Standard & Poor's Corp.	1.0	3.8	1.2	na	0.8	0.9	1.4	1.5	1.9	2.5	3.1	3.8 L	4.6	na	4.3	93.0	2.8	2.5	1.4
Stone Harbor Investment Partners	1.0	4.0	1.1	1.0	0.9	1.0	1.3	1.7	2.3	2.9	3.5	4.4	5.1	na	4.3	95.0	2.6	1.9	2.0
RBS Securities	1.0	4.1	1.1	1.0	1.0	1.2	1.5	1.9	2.4	2.9	3.6	4.7	5.7	4.1	4.6	94.0	2.9	1.7	2.4
Woodworth Holdings	0.9	4.1	1.1	0.9	0.9	0.9	1.1	1.4	2.3	3.0	3.8	4.9	6.0	4.6	4.7	92.0	2.5	0.9 L	1.0 L
MacroFin Analytics	0.9	4.0	1.1	0.9	0.8	0.9	1.0	1.5	2.2	2.9	3.7	4.7	6.1	4.5	4.7	95.2	2.5	1.7	1.9
Wells Fargo	0.9	3.9	1.1	1.0	0.8	0.9	1.0	1.4	1.9	2.4 L	3.1	4.2	5.6	4.1	4.2	98.5	2.6	1.9	2.4
MUFG Union Bank	0.9	4.0	1.0	1.0	0.9	1.0	1.1	2.2	3.0	3.4	3.8	4.6	5.9	4.0	4.9	90.0	2.8	2.5 H	2.8
Societe Generale	0.9	3.9	1.1	na	na	na	na	1.2	1.9	2.6	3.2	na	na	na	na	na	2.6	2.3	3.1 H
Barclays Capital	0.9	4.0	1.1	na	na	na	na	1.6	2.2	2.6	3.2	na	na	na	na	na	2.5	2.0	1.9
PNC Financial Services Corp.	0.9	4.0	1.2	na	1.0	1.0	1.2	1.6	2.1	2.6	3.2	na	5.3	3.7	4.2	92.3	2.3	1.8	2.2
Naroff Economic Advisors	0.9	3.9	1.1	1.0	1.0	1.2	1.3	1.7	2.6	3.4	4.2	5.2	6.2	5.0	5.4	89.7	3.2	2.4	2.3
Bank of America Merrill Lynch	0.8	na	1.1	na	0.8	na	na	1.4	2.1	2.7	3.4	na	na	na	na	na	2.4	1.8	2.2
Moody's Analytics	0.8	3.8	1.2	0.8	0.5 L	0.6	0.8	1.1 L	2.1	3.2	3.8	4.8	6.3	3.9	4.8	na	3.1	1.8	2.4
SunTrust Banks	0.8	3.8	1.2	0.8	0.8	0.9	1.2	1.5	2.1	2.5	3.1	4.5	5.8	4.2	4.8	na	1.6 L	1.6	1.5
Economist Intelligence Unit	0.8	3.8	1.5	1.0	0.8	1.1	1.4	1.8	2.3	3.0	3.6	na	na	na	4.5	na	2.4	na	2.3
Regions Financial Corporation	0.8	3.8	0.9	0.8	0.6	0.7	0.9	1.3	2.0	2.7	3.5	4.5	5.8	na	4.2	99.0	2.6	1.6	2.3
Comerica Bank	0.8	3.8	1.1	na	0.7	0.7	0.8	1.2	1.9	2.5	3.2	na	4.1 L	na	4.2	na	2.6	2.0	2.9
Chase Wealth Management	0.8	3.8	0.9	0.7	0.7	0.8	0.9	1.2	2.0	2.8	3.5	4.8	5.8	4.3	4.5	94.7	3.2	1.9	2.0
Daiwa Capital Markets America	0.8	3.8	1.1	0.8	0.8	1.0	1.1	1.4	2.0	2.6	3.3	4.3	5.6	3.9	4.3	96.0	2.3	2.1	2.0
Nomura Securities, Inc.	0.8	3.8	0.9	0.9	na	na	na	1.3	2.0	2.5	3.1	4.4	5.8	na	4.4	na	2.1	1.6	2.3
RidgeWorth Investments	0.8	3.8	1.0	0.8	0.6	0.8	1.0	1.5	2.5	3.1	3.9	4.7	5.8	4.7	4.8	92.0	2.7	2.2	2.4
Loomis, Sayles & Company	0.8	3.8	1.0	0.9	0.8	0.9	1.1	1.4	2.1	2.7	3.2	4.3	5.2	3.8	4.3	94.1	2.3	2.3	2.7
Moody's Capital Markets Group	0.7	3.7	0.9	0.5 L	0.8	0.9	1.1	1.2	2.0	2.5	3.1	4.1	5.6	3.6 L	4.2	95.2	2.4	1.9	1.8
Action Economics	0.7	3.8	0.6 L	0.7	0.6	0.7	0.9	1.3	1.9	2.6	3.3	4.5	5.8	4.1	4.3	na	2.7	1.5	2.0
The Northern Trust Company	0.7	3.7	0.8	0.7	0.5 L	0.7	0.8	1.2	2.1	2.6	3.4	4.1	5.3	3.9	4.2	na	2.6	1.7	1.8
AIG	0.7	na	na	na	0.7	na	na	1.2	na	2.5	na	na	5.1	na	4.2	na	1.7	1.9	2.4
Fannie Mae	0.6 L	3.6 L	na	na	0.7	0.8	1.1	1.4	2.1	2.4 L	3.1	na	na	na	4.1 L	na	2.3	1.8	2.0
Oxford Economics	0.6 L	3.6 L	na	na	0.5 L	0.5 L	1.0	1.3	1.8 L	2.5	3.2	na	na	na	4.4	94.6	2.8	1.7	1.4
Mesirow Financial	0.6 L	3.6 L	0.8	0.7	0.5 L	0.8	1.2	1.7	2.4	3.0	3.7	4.8	5.6	4.7	4.5	93.0	2.4	2.1	2.2
Georgia State University	0.6 L	3.6 L	na	na	0.6	0.6	0.6 L	1.1 L	1.8 L	2.8	3.3	4.4	5.3	na	4.7	na	2.7	1.7	2.5
December Consensus	**0.9**	**4.0**	**1.2**	**1.0**	**0.9**	**1.0**	**1.3**	**1.6**	**2.3**	**2.8**	**3.5**	**4.6**	**5.7**	**4.3**	**4.6**	**94.0**	**2.6**	**2.0**	**2.2**
Top 10 Avg.	1.3	4.3	1.6	1.3	1.3	1.4	1.7	2.1	2.8	3.3	4.0	5.0	6.2	4.7	5.1	96.9	3.1	2.4	2.8
Bottom 10 Avg.	0.7	3.7	0.9	0.7	0.6	0.7	0.9	1.2	1.9	2.5	3.1	4.2	5.1	3.9	4.2	91.1	2.1	1.5	1.6
September Consensus	0.9	3.9	1.2	0.9	0.8	1.0	1.2	1.5	2.2	2.8	3.5	4.6	5.6	4.2	4.5	92.2	2.6	2.0	2.2
Number of Forecasts Changed From A Month Ago:																			
Down	7	7	10	7	9	7	8	10	7	11	13	5	5	5	6	0	14	10	11
Same	29	25	20	15	21	16	14	17	20	17	17	10	7	11	16	9	25	29	27
Up	11	10	10	9	13	14	15	19	18	18	13	17	22	11	18	19	8	6	9
Diffusion Index	54 %	54 %	50 %	53 %	55 %	59 %	59 %	60 %	62 %	58 %	50 %	69 %	75 %	61 %	65 %	84 %	44 %	46 %	48 %

Fourth Quarter 2016

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	Percent Per Annum -- Average For Quarter: Short-Term								Intermediate-Term			Long-Term				Avg. For Qtr.	(Q-Q % Change) (SAAR)		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	A.	B.	C.	D.
	Federal Funds Rate	Prime Bank Rate	LIBOR Rate 3-Mo.	Com. Paper 1-Mo.	Treas. Bills 3-Mo.	Treas. Bills 6-Mo.	Treas. Bills 1-Yr.	Treas. Notes 2-Yr.	Treas. Notes 5-Yr.	Treas. Notes 10-Yr.	Treas. Bond 30-Yr.	Aaa Corp. Bond	Baa Corp. Bond	State & Local Bonds	Home Mtg. Rate	Fed's Major Currency $ Index	Real GDP	GDP Price Index	Cons. Price Index
Chmura Economics & Analytics	2.3 H	5.3 H	2.5 H	2.3 H	2.0 H	2.2 H	2.5	3.1 H	4.1 H	4.4 H	5.0 H	5.8	na	na	6.0	85.7 L	3.2	1.8	1.9
Swiss Re	1.9	4.9	2.0	1.7	1.6	1.7	2.1	2.4	3.1	3.2	4.0	4.9	5.9	na	5.1	na	3.2	2.4	3.4
GLC Financial Economics	1.8	4.8	2.1	1.9	1.8	1.8	1.9	2.2	3.1	3.7	na	5.9 H	7.1	5.2	6.1 H	89.9	3.2	2.5	3.0
Amherst Pierpont Securities	1.8	4.9	2.2	1.9	1.9	2.2 H	2.6 H	2.9	3.6	3.9	4.7	5.9 H	7.3 H	5.4 H	5.7	98.3	2.9	2.2	3.1
High Frequency Economics	1.6	4.8	na	na	1.8	1.8	2.3	2.5	3.0	3.5	3.9	na	na	na	na	na	2.5	2.2	2.5
RBC	1.5	4.5	na	na	0.8	na	na	1.9	2.5	3.0	3.5	na	na	na	na	na	2.9	2.0	1.6
Scotiabank Group	1.5	4.5	na	na	1.7	na	na	2.5	2.6	2.9	3.4	na	na	na	na	na	2.7	2.0	2.2
DePrince & Assoc.	1.4	4.4	1.8	1.6	1.4	1.5	1.9	2.2	2.4	3.1	3.7	4.8	5.8	4.5	4.9	91.9	2.7	2.3	2.4
RDQ Economics	1.4	4.4	1.8	1.5	1.6	1.8	2.1	2.3	2.9	3.5	4.0	4.9	6.0	4.8	5.0	103.6 H	2.7	2.2	2.3
J.P. Morgan Chase	1.4	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.3	2.0	2.3
Naroff Economic Advisors	1.4	4.4	1.6	1.5	1.5	1.7	1.9	2.4	3.2	3.9	4.6	5.7	6.7	5.4	5.8	89.0	2.2	2.6	2.7
Wells Capital Management	1.3	4.4	1.4	1.3	1.4	1.6	1.9	2.2	2.4	2.8	3.0	4.3	5.7	4.1	4.4	95.5	2.7	2.2	2.0
Goldman Sachs & Co.	1.3	na	1.6	na	1.4	na	na	1.9	2.6	3.0	3.4	na	na	na	4.6	na	2.3	2.0	2.5
UBS AG	1.3	na	1.8	na	1.5	na	na	1.9	2.3	2.5	3.1	na	na	na	na	na	2.7	2.3	3.9
Standard & Poor's Corp.	1.2	4.0	1.4	na	1.1	1.1	1.6	1.7	2.0	2.6	3.2	4.0	4.7	na	4.5	93.1	3.4 H	2.5	2.8
RBS Securities	1.2	4.3	1.4	1.2	1.2	1.4	1.7	2.1	2.5	3.0	3.7	4.8	5.8	4.2	4.8	95.0	2.9	1.7	2.4
Nat'l Assn. of Realtors	1.2	4.2	1.5	1.5	1.3	1.5	1.8	2.1	2.7	3.1	3.8	4.9	5.9	4.7	4.9	na	2.8	2.0	2.4
SunTrust Banks	1.2	4.2	1.3	0.9	1.1	1.2	1.4	1.7	2.2	2.5	3.2	4.4	5.7	4.1	5.1	na	1.2 L	1.7	1.8
Woodworth Holdings	1.2	4.3	1.4	1.1	1.1	1.2	1.3	1.7	2.6	3.3	4.1	5.2	6.3	4.9	5.2	91.5	2.5	1.0 L	1.1 L
Economist Intelligence Unit	1.2	4.2	2.1	1.4	1.0	1.5	1.8	2.0	2.5	3.2	3.8	na	na	na	4.5	na	2.1	na	2.2
MUFG Union Bank	1.2	4.3	1.3	1.3	1.3	1.4	1.5	2.3	3.0	3.4	3.8	4.8	6.1	4.3	4.9	88.0	2.8	2.5	2.6
BMO Capital Markets	1.1	4.3	1.3	na	1.1	1.3	1.3	1.6	2.3	2.7	3.4	na	na	na	4.4	95.0	2.4	2.1	2.3
BNP Paribas Americas	1.1	na	1.4	na	na	na	na	2.1	2.5	2.8	na	na	na	na	na	na	1.9	na	2.9
Barclays Capital	1.1	4.3	1.3	na	na	na	na	1.7	2.3	2.6	3.2	na	na	na	na	na	2.5	2.0	1.8
MacroFin Analytics	1.1	4.2	1.3	1.1	1.0	1.1	1.2	1.7	2.4	3.1	3.9	4.9	6.3	4.7	4.9	95.7	2.5	1.8	1.9
Stone Harbor Investment Partners	1.1	4.1	1.3	1.1	1.0	1.2	1.5	1.8	2.4	3.0	3.5	4.5	5.2	na	4.4	93.0	2.8	1.6	2.2
Wells Fargo	1.1	4.1	1.3	1.2	1.2	1.3	1.4	1.7	2.0	2.5	3.1	4.3	5.7	4.1	4.3	99.8	2.5	2.0	2.2
Bank of America Merrill Lynch	1.1	na	1.3	na	1.0	na	na	1.5	2.2	2.7	3.4	na	na	na	na	na	2.4	1.9	2.6
Comerica Bank	1.0	4.0	1.3	na	0.9	1.0	1.1	1.4	2.1	2.6	3.3	na	4.3 L	na	4.3	na	2.6	1.9	2.1
Societe Generale	1.0	4.0	1.3	na	na	na	na	1.4	2.0	2.7	3.2	na	na	na	na	na	2.7	2.7 H	4.7 H
Daiwa Capital Markets America	1.0	4.0	1.3	1.1	1.0	1.2	1.4	1.6	2.2	2.7	3.4	4.4	5.7	4.0	4.5	97.0	2.3	2.1	2.1
Regions Financial Corporation	1.0	4.0	1.1	1.0	0.7	0.8	1.1	1.4	2.2	2.9	3.7	4.6	5.8	na	4.2	99.4	2.4	1.7	2.2
Cycledata Corp.	1.0	4.2	1.2	1.1	1.0	1.1	1.3	1.6	2.2	2.8	3.5	4.6	5.7	4.2	4.4	92.0	2.2	2.0	2.2
RidgeWorth Investments	1.0	4.0	1.3	1.1	0.9	1.1	1.2	1.8	2.8	3.4	4.1	4.9	5.9	4.2	5.1	91.0	2.7	2.2	2.4
Moody's Analytics	1.0	4.0	1.3	0.9	0.6	0.7	1.1	1.5	2.3	3.3	3.9	4.9	6.4	4.0	5.1	na	2.9	2.1	2.8
Loomis, Sayles & Company	1.0	4.0	1.3	1.1	1.0	1.2	1.3	1.7	2.3	2.9	3.3	4.4	5.3	3.9	4.5	94.1	2.1	2.4	2.8
PNC Financial Services Corp.	0.9	4.1	1.3	na	1.1	1.1	1.3	1.7	2.2	2.6	3.2	na	5.3	3.7	4.2	92.0	2.3	1.8	2.2
AIG	0.9	na	na	na	1.0	na	na	1.2	na	2.6	na	na	5.1	na	4.2	na	2.5	2.0	2.3
Nomura Securities, Inc.	0.9	3.9	1.1	1.1	na	na	na	1.4	2.0	2.5	3.1	4.4	5.8	na	4.4	na	2.0	1.6	2.2
Action Economics	0.8	4.0	0.9 L	0.8	0.8	0.9	1.1	1.4	2.0	2.6	3.4	4.5	5.8	4.1	4.4	na	2.7	1.1	2.2
Fannie Mae	0.8	3.8	na	na	0.9	1.1	1.3	1.6	2.2	2.5	3.2	na	na	na	4.2	na	2.4	1.7	1.9
Moody's Capital Markets Group	0.8	3.8	1.0	0.6 L	0.9	1.0	1.1	1.2 L	1.9 L	2.4 L	2.9 L	4.0 L	5.4	3.4 L	4.1 L	95.8	2.7	1.8	1.4
Mesirow Financial	0.8	3.8	1.0	0.8	0.7	1.1	1.6	2.0	2.7	3.2	3.9	4.8	5.7	4.9	4.7	93.1	2.3	2.1	2.2
Chase Wealth Management	0.8	3.8	0.9 L	0.7	0.7	0.8	0.9	1.2 L	2.0	2.8	3.5	4.8	5.8	4.3	4.5	94.5	3.0	2.0	2.0
The Northern Trust Company	0.7 L	3.7	0.9 L	0.7	0.6	0.8	0.9	1.3	2.2	2.7	3.5	4.2	5.3	4.0	4.3	na	2.6	1.7	1.8
Georgia State University	0.7 L	3.7	na	na	0.6	0.7	0.6 L	1.2 L	1.9 L	2.8	3.4	4.6	5.5	na	4.8	na	2.7	1.8	2.4
Oxford Economics	0.7 L	3.6 L	na	na	0.5 L	0.6 L	1.0	1.3	1.9 L	2.6	3.3	na	na	na	4.4	94.6	2.7	1.9	1.7
December Consensus	**1.2**	**4.2**	**1.4**	**1.2**	**1.1**	**1.3**	**1.5**	**1.8**	**2.4**	**3.0**	**3.6**	**4.8**	**5.8**	**4.4**	**4.7**	**93.9**	**2.6**	**2.0**	**2.4**
Top 10 Avg.	1.7	4.7	1.9	1.7	1.7	1.8	2.1	2.5	3.1	3.6	4.2	5.3	6.4	4.9	5.4	97.5	3.0	2.4	3.2
Bottom 10 Avg.	0.8	3.8	1.1	0.9	0.7	0.8	1.0	1.3	2.0	2.5	3.1	4.3	5.2	3.9	4.3	90.4	2.1	1.6	1.7
November Consensus	1.2	4.2	1.4	1.2	1.1	1.2	1.5	1.8	2.4	3.0	3.6	4.7	5.7	4.4	4.7	91.8	2.6	2.0	2.3
Number of Forecasts Changed From A Month Ago:																			
Down	7	7	9	7	9	4	5	10	9	12	14	7	6	7	13	1	8	11	10
Same	29	23	19	13	21	19	17	17	18	15	14	10	5	9	12	11	28	25	27
Up	11	11	10	9	12	13	14	18	17	18	14	13	15	5	13	13	11	9	10
Diffusion Index	54 %	55 %	51 %	53 %	54 %	63 %	63 %	59 %	59 %	57 %	50 %	60 %	67 %	45 %	50 %	74 %	53 %	48 %	50 %

First Quarter 2017

Interest Rate Forecasts

Key Assumptions

Blue Chip Financial Forecasts Panel Members	Percent Per Annum -- Average For Quarter: Short-Term: 1 Federal Funds Rate	2 Prime Bank Rate	3 LIBOR Rate 3-Mo.	4 Com. Paper 1-Mo.	5 Treas. Bills 3-Mo.	6 Treas. Bills 6-Mo.	7 Treas. Bills 1-Yr.	Intermediate-Term: 8 Treas. Notes 2-Yr.	9 Treas. Notes 5-Yr.	10 Treas. Notes 10-Yr.	Long-Term: 11 Treas. Bond 30-Yr.	12 Aaa Corp. Bond	13 Baa Corp. Bond	14 State & Local Bonds	15 Home Mtg. Rate	Avg. For ---Qtr.--- A. Fed's Major Currency $ Index	(Q-Q % Change) (SAAR) B. Real GDP	C. GDP Price Index	D. Cons. Price Index
Chmura Economics & Analytics	2.8 H	5.8 H	3.1 H	2.9 H	2.5 H	2.8 H	3.1 H	3.6 H	4.4 H	4.7 H	5.2 H	6.1	na	na	6.3	83.5 L	2.9	1.9	2.1
Swiss Re	2.3	5.3	2.4	2.1	2.0	2.1	2.4	2.7	3.3	3.5	4.3	5.1	6.1	na	5.5	na	3.0	1.0 L	1.0 L
GLC Financial Economics	2.3	5.3	2.5	2.3	2.2	2.3	2.3	2.6	3.5	4.1	na	6.3 H	7.5 H	5.7 H	6.7 H	89.7	2.8	2.7	3.1
Amherst Pierpont Securities	2.1	5.2	2.6	2.2	2.2	2.4	2.8	3.2	3.9	4.1	4.9	6.0	7.4	5.6	6.0	99.0	2.4	2.3	3.2 H
RBC	2.0	5.0	na	na	1.2	na	na	2.3	2.8	3.3	3.7	na	na	na	na	na	2.7	na	1.6
High Frequency Economics	2.0	5.1	na	na	2.1	2.2	2.7	2.9	3.3	3.7	4.0	na	na	na	na	na	2.3	2.3	2.6
Naroff Economic Advisors	1.8	4.8	2.1	2.0	2.0	2.2	2.5	3.0	3.5	4.2	5.1	6.1	7.0	5.7 H	6.1	87.8	2.6	2.8	2.9
Scotiabank Group	1.8	4.8	na	na	1.9	na	na	2.8	2.9	3.1	3.6	na	na	na	na	na	2.8	2.0	2.4
DePrince & Associates	1.7	4.7	2.0	1.9	1.7	1.8	2.2	2.5	2.7	3.3	3.9	5.0	6.0	4.7	5.1	91.5	2.8	2.3	2.6
Economist Intelligence Unit	1.5	4.5	2.3	1.6	1.2	1.8	2.0	2.2	2.7	3.4	4.0	na	na	na	5.0	na	2.6	na	2.2
Goldman Sachs	1.5	na	1.8	na	1.6	na	na	2.0	2.7	3.0	3.4	na	na	na	4.8	na	2.3	2.0	2.4
Cycledata Corp.	1.5	4.7	1.7	1.6	1.5	1.6	1.8	2.1	2.7	3.3	4.0	5.1	6.1	4.7	4.9	92.0	2.1	2.1	2.4
UBS AG	1.5	na	2.0	na	1.8	na	na	2.1	2.5	2.6	3.1	na	na	na	na	na	2.4	2.3	2.5
Wells Capital Management	1.5	4.6	1.6	1.6	1.6	1.8	2.0	2.4	2.5	2.8	3.1	4.4	5.8	4.1	4.5	95.6	2.7	1.8	2.0
SunTrust Banks	1.5	4.5	1.7	1.2	1.3	1.5	1.6	1.8	2.3	2.6	3.2	4.4	5.7	4.1	5.4	na	3.3 H	1.8	2.0
Standard & Poor's Corp.	1.5	4.1	1.7	na	1.2	1.3	1.8	1.8	2.1	2.6	3.3	4.1	4.8	na	4.6	92.3	2.6	3.1 H	2.9
RBS Securities	1.5	4.6	1.6	1.5	1.5	1.7	1.9	2.3	2.8	3.2	3.8	5.0	5.9	4.3	5.0	95.0	2.5	1.6	2.5
Woodworth Holdings	1.4	4.6	1.6	1.4	1.4	1.4	1.6	1.9	2.9	3.5	4.3	5.4	6.6	5.1	5.4	91.0	2.5	1.2	1.2
MacroFin Analytics	1.4	4.5	1.6	1.4	1.3	1.4	1.5	2.0	2.7	3.4	4.2	5.2	6.6	5.0	5.2	96.3	2.3	1.9	2.0
Wells Fargo	1.4	4.4	1.6	1.5	1.4	1.5	1.6	1.9	2.2	2.6	3.2	4.4	5.8	4.2	4.4	100.5 H	2.3	1.9	2.1
MUFG Union Bank	1.4	4.5	1.5	1.5	1.5	1.6	1.8	2.5	3.2	3.5	3.9	5.0	6.2	4.3	5.0	87.0	2.7	2.5	2.4
Nat'l Assn. of Realtors	1.4	4.5	1.7	1.7	1.5	1.7	2.0	2.2	2.9	3.4	4.0	5.1	6.0	4.9	5.0	na	2.8	2.0	2.5
BNP Paribas Americas	1.4	na	1.5	na	na	na	na	2.3	2.5	2.8	na	na	na	na	na	na	1.9 L	na	1.8
Moody's Analytics	1.4	4.4	1.7	1.2	0.9	1.0	1.5	1.8	2.9	3.7	4.2	5.3	6.8	4.3	5.4	na	3.2	2.5	2.7
Comerica Bank	1.3	4.3	1.6	na	1.1	1.2	1.3	1.6	2.3	2.8	3.4	na	4.5 L	na	4.5	na	2.6	2.1	1.8
Societe Generale	1.3	4.3	1.7	na	na	na	na	1.6	2.2	2.8	3.4	na	na	na	na	na	2.7	2.3	3.0
Stone Harbor Investment Partners	1.3	4.3	1.4	1.3	1.2	1.3	1.6	1.9	2.5	3.0	3.5	4.6	5.3	na	4.5	91.0	2.4	2.3	2.0
Daiwa Capital Markets America	1.3	4.3	1.6	1.3	1.3	1.5	1.6	1.8	2.4	2.8	3.5	4.5	5.8	4.0	4.6	98.0	2.3	2.1	2.2
Loomis, Sayles & Company	1.3	4.3	1.5	1.4	1.3	1.4	1.6	2.0	2.5	3.0	3.3	4.6	5.4	3.9	4.7	94.1	2.0	2.5	2.9
BMO Capital Markets	1.2	4.3	1.4	na	1.2	1.4	1.4	1.8	2.4	2.8	3.5	na	na	na	4.5	94.5	2.3	2.0	2.2
AIG	1.2	na	na	na	1.3	na	na	1.4	na	2.6	na	na	5.1	na	4.2	na	2.3	2.1	2.3
PNC Financial Services Corp.	1.2	4.3	1.5	na	1.3	1.3	1.5	1.8	2.3	2.7	3.2	na	5.3	3.7	4.2	92.0	2.4	2.0	2.4
Barclays Capital	1.1	4.3	na	na	na	na	na	na	na	na	na	na	na	na	na	na	2.5	2.1	1.8
Fannie Mae	1.1	4.1	na	na	1.2	1.4	1.5	1.7	2.3	2.5	3.2	na	na	na	4.2	na	2.2	1.9	2.0
Nomura Securities, Inc.	1.1	4.1	1.2	1.2	na	na	na	1.5	1.9	2.4 L	3.0	4.3	5.8	na	4.4	na	2.0	1.6	2.2
Action Economics	1.1	4.3	1.1	1.0	1.0	1.1	1.3	1.6	2.2	2.7	3.5	4.5	5.9	4.1	4.5	na	2.3	2.0	2.4
Moody's Capital Markets Group	1.0	4.0	1.2	0.7 L	1.1	1.2	1.3	1.3	1.8 L	2.4 L	2.7 L	3.8 L	5.4	3.3 L	4.1 L	96.0	2.6	1.9	1.7
Regions Financial Corporation	1.0	4.0	1.2	1.1	0.8	1.0	1.3	1.6	2.3	3.0	3.8	4.6	5.8	na	4.3	98.2	2.2	1.8	2.4
Chase Wealth Management	1.0	4.0	1.1	0.9	0.9	1.0	1.1	1.4	2.2	3.0	3.7	5.0	6.0	4.5	4.7	94.4	2.7	2.0	2.1
Mesirow Financial	1.0	4.0	1.3	1.0	0.9	1.3	1.8	2.2	2.8	3.3	4.0	4.8	5.7	5.0	4.8	92.7	2.5	2.2	2.1
RidgeWorth Investments	1.0	4.0	1.3	1.1	0.9	1.1	1.2	1.8	2.8	3.4	4.1	4.8	5.7	4.4	5.1	90.0	2.7	2.2	2.2
The Northern Trust Company	1.0	4.0	1.1 L	1.0	0.8	1.0	1.2	1.6	2.3	2.8	3.6	4.3	5.4	4.1	4.4	na	2.4	1.8	1.9
Oxford Economics	0.9 L	3.7 L	na	na	0.7 L	0.8 L	1.2	1.5	2.0	2.7	3.4	na	na	na	4.6	93.8	2.7	2.0	2.1
Georgia State University	0.9 L	4.0	na	na	0.8	1.0	1.0 L	1.3 L	2.1	3.0	3.4	4.6	5.6	na	5.0	na	2.3	1.8	2.2
December Consensus	**1.4**	**4.5**	**1.7**	**1.5**	**1.4**	**1.5**	**1.7**	**2.0**	**2.6**	**3.1**	**3.7**	**4.9**	**5.9**	**4.5**	**4.9**	**93.2**	**2.5**	**2.1**	**2.2**
Top 10 Avg.	2.0	5.1	2.2	2.0	2.0	2.1	2.4	2.8	3.4	3.8	4.4	5.6	6.6	5.1	5.7	96.8	2.9	2.5	2.8
Bottom 10 Avg.	1.0	4.0	1.2	1.1	0.9	1.0	1.2	1.5	2.1	2.6	3.1	4.3	5.2	4.0	4.3	89.6	2.2	1.6	1.7
November Consensus	1.4	4.4	1.7	1.5	1.3	1.5	1.7	2.0	2.6	3.1	3.8	4.9	5.8	4.5	4.9	90.7	2.5	2.1	2.3
Number of Forecasts Changed From A Month Ago:																			
Down	6	5	8	8	6	7	7	7	9	9	10	10	8	4	11	1	9	8	10
Same	29	26	20	11	24	16	13	20	16	18	14	7	8	8	11	9	29	28	29
Up	9	9	8	8	10	12	15	16	17	16	16	11	14	11	15	15	6	5	5
Diffusion Index	53 %	55 %	50 %	50 %	55 %	57 %	61 %	60 %	60 %	58 %	58 %	52 %	60 %	65 %	55 %	78 %	47 %	46 %	44 %

International Interest Rate And Foreign Exchange Rate Forecasts

United States

	3 Mo. Interest Rate %			10 Yr. Gov't Bond Yield %			Fed's Major Currency $ Index		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	2.40	2.50	na	na	na	na
BMO Capital Markets	0.60	0.80	1.30	2.40	2.50	2.70	94.4	94.9	95.0
BNP Paribas Americas	na	na	na	2.55	2.75	2.75	na	na	na
ING Financial Markets	0.55	0.70	0.95	2.30	2.40	2.50	na	na	na
Mizuho Research Institute	0.60	0.85	1.35	2.35	2.45	2.70	94.0	95.0	96.0
Moody's Analytics	0.75	1.02	1.29	2.58	2.82	3.32	na	na	na
Moody's Capital Markets	na	na	na	2.35	2.45	2.40	94.2	94.8	95.8
Nomura Securities	na	na	na	2.30	2.40	2.50	na	na	na
Oxford Economics	na	na	na	2.37	2.43	2.60	94.0	94.5	96.6
Scotiabank	na	na	na	2.35	2.55	2.75	na	na	na
UBS AG	na	na	na	2.40	2.40	2.50	na	na	na
Wells Fargo	0.70	0.95	1.45	2.29	2.35	2.51	na	na	na
December Consensus	**0.64**	**0.86**	**1.27**	**2.39**	**2.50**	**2.66**	**94.1**	**94.8**	**95.9**
High	0.75	1.02	1.45	2.58	2.82	3.32	94.4	95.0	96.6
Low	0.55	0.70	0.95	2.29	2.35	2.40	94.0	94.5	95.0
Last Months Avg.	0.44	0.70	1.08	2.25	2.36	2.56	93.1	95.0	94.1

Japan

	3 Mo. Interest Rate %			10 Yr. Gov't Bond Yield %			Yen/USD		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	0.35	0.35	na	123.0	123.0	na
BMO Capital Markets	0.10	0.10	0.10	0.40	0.50	0.60	123.0	124.0	127.0
BNP Paribas Americas	na	na	na	0.50	0.60	0.70	128.0	130.0	134.0
ING Financial Markets	0.15	0.15	0.15	0.37	0.40	0.45	123.0	125.0	125.0
Mizuho Research Institute	0.17	0.17	0.17	0.35	0.45	0.55	126.0	126.0	127.0
Moody's Analytics	na	na	na	0.43	0.47	0.53	127.0	129.5	132.1
Moody's Capital Markets	na	na	na	0.32	0.36	0.40	124.0	125.0	126.0
Nomura Securities	na	na	na	0.65	0.90	1.05	126.0	128.0	130.0
Oxford Economics	na	na	na	0.32	0.32	0.35	122.7	124.3	125.9
Scotiabank	na	na	na	na	na	na	125.0	128.0	130.0
UBS AG	na	na	na	0.40	0.45	3.00	na	na	na
Wells Fargo	0.05	0.05	0.05	0.42	0.45	0.55	na	na	na
December Consensus	**0.12**	**0.12**	**0.12**	**0.41**	**0.48**	**0.82**	**124.8**	**126.3**	**128.6**
High	0.17	0.17	0.17	0.65	0.90	3.00	128.0	130.0	134.0
Low	0.05	0.05	0.05	0.32	0.32	0.35	122.7	123.0	125.0
Last Months Avg.	0.14	0.14	0.14	0.46	0.52	0.61	123.3	124.9	127.3

United Kingdom

	3 Mo. Interest Rate %			10 Yr. Gilt Yields %			USD/Pound Sterling		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	2.10	2.20	na	1.43	1.42	na
BMO Capital Markets	0.60	1.00	1.50	2.10	2.25	2.45	1.52	1.53	1.55
BNP Paribas Americas	na	na	na	2.10	2.20	2.30	1.51	1.48	1.52
ING Financial Markets	0.70	1.00	1.30	2.10	2.40	2.50	1.50	1.40	1.57
Mizuho Research Institute	0.60	0.60	0.85	1.80	1.80	2.00	na	na	na
Moody's Analytics	na	na	na	2.27	2.59	2.93	1.52	1.52	1.54
Moody's Capital Markets	na	na	na	2.02	2.13	2.14	1.50	1.50	1.49
Nomura Securities	na	na	na	2.30	2.40	2.50	1.57	1.52	1.54
Oxford Economics	na	na	na	2.04	2.15	2.39	1.47	1.46	1.44
Scotiabank	na	na	na	na	na	na	1.51	1.51	1.45
UBS AG	na	na	na	2.40	2.60	3.00	na	na	na
Wells Fargo	0.65	0.90	1.20	2.15	2.30	2.40	na	na	na
December Consensus	**0.64**	**0.88**	**1.21**	**2.13**	**2.27**	**2.46**	**1.50**	**1.48**	**1.51**
High	0.70	1.00	1.50	2.40	2.60	3.00	1.57	1.53	1.57
Low	0.60	0.60	0.85	1.80	1.80	2.00	1.43	1.40	1.44
Last Months Avg.	0.62	0.67	0.95	2.03	2.14	2.36	1.52	1.52	1.52

Switzerland

	3 Mo. Interest Rate %			10 Yr. Gov't Bond Yield %			CHF/USD		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	na	na	na	1.15	1.18	na
BMO Capital Markets	na	na	na	na	na	na	1.01	1.03	1.06
BNP Paribas Americas	na	na	na	na	na	na	1.08	1.12	1,14
ING Financial Markets	-0.75	-0.70	-0.50	-0.10	0.00	0.10	1.05	1.11	1.10
Mizuho Research Institute	na	na	na	na	na	na	na	na	na
Moody's Analytics	na	na	na	-0.13	-0.02	0.20	1.04	1.10	1.16
Moody's Capital Markets	na	na	na	-0.28	-0.18	0.00	1.02	1.02	1.02
Nomura Securities	na	na	na	na	na	na	1.03	1.10	1.12
Oxford Economics	na	na	na	-0.13	0.02	0.33	1.01	1.03	1.05
Scotiabank	na	na	na	na	na	na	1.03	1.03	1.16
UBS AG	na	na	na	-0.05	0.10	0.50	na	na	na
Wells Fargo	na	na	na	na	na	na	na	na	na
December Consensus	**-0.75**	**-0.70**	**-0.50**	**-0.14**	**-0.02**	**0.23**	**1.05**	**1.08**	**1.10**
High	na	na	na	-0.05	0.10	0.50	1.15	1.18	1.16
Low	na	na	na	-0.28	-0.18	0.00	1.01	1.02	1.02
Last Months Avg.	-0.75	-0.75	-0.60	-0.10	0.02	0.29	1.01	1.04	1.07

Canada

	3 Mo. Interest Rate %			10 Yr. Gov't Bond Yield %			CAD/USD		
Blue Chip Forecasters	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.	In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	na	na	na	1.37	1.41	na
BMO Capital Markets	0.80	0.80	0.80	1.75	1.85	2.00	1.35	1.35	1.31
BNP Paribas Americas	na	na	na	na	na	na	1.38	1.39	1.38
ING Financial Markets	0.60	0.80	1.40	1.80	2.10	2.70	1.34	1.36	1.32
Mizuho Research Institute	na	na	na	na	na	na	na	na	na
Moody's Analytics	na	na	na	2.49	2.76	3.14	1.24	1.23	1.18
Moody's Capital Markets	na	na	na	1.70	1.80	1.80	1.33	1.34	1.34
Nomura Securities	na	na	na	1.65	1.75	1.95	1.35	1.36	1.37
Oxford Economics	na	na	na	1.63	1.80	2.13	1.33	1.32	1.28
Scotiabank	na	na	na	1.75	2.00	2.15	1.37	1.37	1.39
UBS AG	na	na	na	1.80	2.00	2.40	na	na	na
Wells Fargo	0.80	0.80	1.25	1.80	1.90	2.10	na	na	na
December Consensus	**0.73**	**0.80**	**1.15**	**1.82**	**2.00**	**2.26**	**1.34**	**1.35**	**1.32**
High	0.80	0.80	1.40	2.49	2.76	3.14	1.38	1.41	1.39
Low	0.60	0.80	0.80	1.63	1.75	1.80	1.24	1.23	1.18
Last Months Avg.	0.60	0.60	1.10	1.70	1.85	2.19	1.33	1.33	1.32

International Interest Rate And Foreign Exchange Rate Forecasts

Australia

Blue Chip Forecasters	3 Mo. Interest Rate % In 3 Mo.	In 6 Mo.	In 12 Mo.	10 Yr. Gov't Bond Yield % In 3 Mo.	In 6 Mo.	In 12 Mo.	USD/AUD In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	na	na	na	0.66	0.64	na
BMO Capital Markets	na	na	na	na	na	na	0.70	0.69	0.72
BNP Paribas Americas	na	na	na	3.10	3.25	3.30	0.68	0.67	0.67
ING Financial Markets	1.90	2.00	2.50	2.90	3.10	3.80	0.67	0.67	0.72
Mizuho Research Institute	na	na	na	na	na	na	na	na	na
Moody's Analytics	na	na	na	2.81	2.87	2.93	0.69	0.69	0.70
Moody's Capital Markets	na	na	na	2.97	3.00	2.95	0.72	0.71	0.71
Nomura Securities	na	na	na	2.80	2.90	3.10	0.69	0.68	0.67
Oxford Economics	na	na	na	3.04	3.17	3.73	0.69	0.68	0.69
Scotiabank	na	na	na	na	na	na	0.70	0.70	0.65
UBS AG	na	na	na	2.70	2.70	3.00	na	na	na
Wells Fargo	na	na	na	na	na	na	na	na	na
December Consensus	**1.90**	**2.00**	**2.50**	**2.90**	**3.00**	**3.26**	**0.69**	**0.68**	**0.69**
High	1.90	2.00	2.50	3.10	3.25	3.80	0.72	0.71	0.72
Low	1.90	2.00	2.50	2.70	2.70	2.93	0.66	0.64	0.65
Last Months Avg.	1.90	1.90	2.30	2.82	2.94	3.25	0.70	0.69	0.71

Eurozone

Blue Chip Forecasters	3 Mo. Interest Rate % In 3 Mo.	In 6 Mo.	In 12 Mo.	USD/EUR In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	na	na	na	1.00	0.98	na
BMO Capital Markets	-0.05	-0.05	-0.05	1.07	1.06	1.04
BNP Paribas Americas	na	na	na	1.04	1.02	1.02
ING Financial Markets	-0.07	-0.06	-0.03	1.02	0.98	1.02
Mizuho Research Institute	-0.13	-0.13	-0.13	1.05	1.04	1.03
Moody's Analytics	na	na	na	1.04	0.99	0.94
Moody's Capital Markets	na	na	na	1.04	1.03	1.02
Nomura Securities	-0.05	-0.05	-0.05	1.05	1.00	1.00
Oxford Economics	na	na	na	1.08	1.07	1.05
Scotiabank	na	na	na	1.05	1.05	0.95
UBS AG	na	na	na	na	na	na
Wells Fargo	-0.10	-0.10	-0.05	na	na	na
December Consensus	**-0.08**	**-0.08**	**-0.06**	**1.04**	**1.02**	**1.01**
High	-0.05	-0.05	-0.03	1.08	1.07	1.05
Low	-0.13	-0.13	-0.13	1.00	0.98	0.94
Last Months Avg.	-0.03	-0.06	-0.06	1.08	1.06	1.04

10 Yr. Gov't Bond Yields %

Blue Chip Forecasters	Germany In 3 Mo.	In 6 Mo.	In 12 Mo.	France In 3 Mo.	In 6 Mo.	In 12 Mo.	Italy In 3 Mo.	In 6 Mo.	In 12 Mo.	Spain In 3 Mo.	In 6 Mo.	In 12 Mo.
Barclays	0.75	0.80	na	na	na	na	na	na	na	na	na	na
BMO Capital Markets	0.65	0.75	0.90	na	na	na	na	na	na	na	na	na
BNP Paribas Americas	0.40	0.45	0.70	0.65	0.70	1.00	1.20	1.25	1.60	1.30	1.30	1.60
ING Financial Markets	0.90	0.95	1.25	1.15	1.20	1.45	1.85	1.80	2.00	1.90	1.85	2.00
Mizuho Research Institute	0.50	0.50	0.60	na	na	na	na	na	na	na	na	na
Moody's Analytics	0.78	0.85	1.02	0.80	0.81	0.85	1.90	1.95	2.15	1.84	1.99	2.25
Moody's Capital Markets	0.60	0.73	0.80	0.93	1.05	1.15	1.56	1.68	1.75	1.70	1.82	1.93
Nomura Securities	0.65	0.75	0.90	na	na	na	na	na	na	na	na	na
Oxford Economics	0.67	0.82	1.13	1.05	1.21	1.54	1.80	2.00	2.31	1.87	2.02	2.35
UBS	1.10	1.30	1.70	1.40	1.60	2.00	2.40	2.60	3.00	na	na	na
Wells Fargo	0.75	0.80	0.95	na	na	na	na	na	na	na	na	na
December Consensus	**0.70**	**0.79**	**1.00**	**1.00**	**1.10**	**1.33**	**1.79**	**1.88**	**2.14**	**1.72**	**1.80**	**2.03**
High	1.10	1.30	1.70	1.40	1.60	2.00	2.40	2.60	3.00	1.90	2.02	2.35
Low	0.40	0.45	0.60	0.65	0.70	0.85	1.20	1.25	1.60	1.30	1.30	1.60
Last Months Avg.	0.77	0.86	1.05	1.18	1.26	1.53	1.97	2.05	2.35	1.95	1.98	2.16

Consensus Forecasts 10-year Bond Yields vs U.S. Yield

	Current	In 3 Mo.	In 6 Mo.	In 12 Mo.
Japan	-1.91	-1.98	-2.02	-1.84
United Kingdom	-0.30	-0.26	-0.23	-0.20
Switzerland	-2.52	-2.52	-2.52	-2.43
Canada	-0.64	-0.57	-0.50	-0.39
Australia	0.65	0.52	0.50	0.60
Germany	-1.76	-1.68	-1.71	-1.66
France	-1.38	-1.39	-1.41	-1.33
Italy	-0.79	-0.60	-0.62	-0.52
Spain	-0.60	-0.67	-0.70	-0.63

Consensus Forecasts 3 Mo. Deposit Rates vs U.S. Rate

	Current	In 3 Mo.	In 6 Mo.	In 12 Mo.
Japan	-0.33	-0.52	-0.98	-1.15
United Kingdom	0.17	0.00	0.01	-0.06
Switzerland	-1.21	-1.39	-1.56	-1.77
Canada	0.36	0.09	-0.06	-0.12
Australia	2.23	1.26	1.14	1.23
Eurozone	-0.50	-0.72	-0.94	-1.33

Viewpoints: A Sampling of Views on the Economy, Financial Markets and Government Policy Excerpted from Recent Reports Issued by our Blue Chip Panel Members and Others

Fed Milestone: Getting Out Of ZIRP

The Fed has been tiptoeing to the exit since May 2013 when former Chair Ben Bernanke announced that the Fed would taper its bond purchases if the economy continued to improve. The Fed hesitated that fall, as both the growth and inflation data were weaker than expected, but after a three-month delay, it started a steady winding down of its purchase program. In our view, history is likely repeating itself, with a delay in September, followed by the first hike in December.

Looking ahead, we expect the Fed to hike three (or perhaps four) times next year, assuming its growth, inflation and markets forecasts remain on track. Achieving those forecasts should not be difficult. While our core PCE forecast runs slightly below the median FOMC forecast, we think its forecast for both GDP growth and the unemployment rate is too pessimistic. We also believe the markets will be calm around the exit. When the Fed threatened to taper in 2013 there was a "taper tantrum" in the markets, but once the markets adjusted to the idea, the actual tapering had no noticeable difference. We see a similar process at play today, with market volatility in front of the exit, but a calmer response to the now well-telegraphed actual hikes.

A successful Fedexodus – with both higher rates and higher inflation – will be critical to both the US and global economy. With interest rates close to zero in so many countries, the world is vulnerable to another shock. The further down the exit path the Fed goes, the more ammunition it will have to fight the next crisis. Moreover, Fedexodus would create hope that both the BOJ and ECB can follow the same path.

There is still considerable concern that the Fed will only do "one and done" or "two and through." However, it is worth recalling that similar pessimism emerged in 2003. Some argued that the Fed would "never" be able to normalize, and as the Fed hiked, pessimists repeatedly predicted "one and done." Seventeen rate hikes later the Fed stopped.

Ethan Harris, Bank of America-Merrill Lynch, New York, NY

That Productivity Thing

J.P. Morgan's macroeconomic views have rested on two building blocks in recent years. The first is the expectation that divergent demand impulses will prove persistent as developed market (DM) healing occurs alongside an unwind of emerging market (EM) excesses following a growth and credit boom. This tug-of-war has produced weaker-than-expected growth this year, but the contours of activity have aligned with our expectations. DM economies have sustained above-trend growth despite net trade drags related to weak EM demand and currencies. At the same time, subpar EM performance has not derailed the global expansion. Indeed, it has rotated global demand toward DM households by depressing goods prices and global interest rates.

Whether this pattern of bounded and divergent growth can be sustained remains a central focus of our analysis for the year ahead. However, our second building block—a global supply slide that is broadly lowering global potential growth estimates—is central to the medium-term global outlook. We published a special report this week that highlights the continued disappointment in global productivity growth, which slowed to a meager 0.3% rise in the year ending in 2Q15. With productivity trends continuing to weaken and global investment spending still stagnant, we have lowered our estimates of global potential growth for 2016 and 2017 to 2.6%. Cumulatively our estimates of DM and EM potential growth have declined by 0.4%-pt and 1.5%-pts respectively over the past decade.

This forecast revision is less than seems warranted by recent labor force and productivity growth outcomes. Indeed, we project a pickup in labor productivity growth in the coming two years particularly in the US (Table 1). However, a downward trajectory in underlying productivity growth will remain in place and our estimate of US potential has fallen to 1.5%-1.75%. Combined with demographic trends, this development implies lower income gains for households and businesses across the world and lower tax revenues for governments facing elevated public sector debt and rising entitlement liabilities related to aging. Lower potential growth rates also likely reduce equilibrium interest rates. But for any given rate of growth, it means that slack is being eaten up faster or is rising more slowly.

Table 1: US outlook under alternative productivity scenarios

.	1Q12 to 4Q15F	2016 (Q4/Q4) Fed	2016 (Q4/Q4) JPM fcst
Real GDP (%chg, saar)	2.2	2.2	2.2
Productivity (%chg, saar)*	0.3	1.4	1.1
Employment (1000s, avg mnthly)	214	102	137
Labor force (1000s, avg mnthly)	66	86	86
Unemployment rate (eop)	5.0	4.8	4.5
4-quarter change (avg)	-0.9	-0.2	-0.5

**Productivity defined as real GDP/NF Payrolls; Source: J.P. Morgan, FRB (shaded area implied by Fed forecasts under 0.7% labor force growth and stable workweek)*

There are two aspects of recent economic performance where sliding potential growth has been important. First, it probably helps explain the persistent disappointment in J.P. Morgan's and consensus economic forecasts, as forecasters have been slow to incorporate weaker underlying trends. Our global Forecast Revision Index (FRI) has fallen 9% since 2007 in line with the gap between realized productivity gains and its trend during the previous expansion.

Second, global core CPI inflation has drifted higher over the past two years, an outcome that seems at odds with our previous estimates of potential, which incorporated a rise in global output gaps. However, global unemployment rates have been falling steadily. Applying an Okun's law based estimate of the output gap—which points to considerably lower global potential growth rates and a falling output gap—aligns closely with actual core inflation performance.

Although the US Fed has not talked about productivity performance much, we expect it will play an important role guiding the normalization path. The FOMC forecast that the US unemployment rate stabilizes close to its current level implicitly assumes a strong productivity bounce. If our forecast is right, the Fed will be disappointed and see the unemployment rate continue on a downward trajectory alongside a more modest productivity rebound. The implications for policy action should be blunted by the continued appreciation in the dollar we expect, but are a central reason why we expect the Fed to raise policy rates to 1.5% next year.

Bruce Kasman and David Hensley, JPMorgan Chase Bank, New York, NY

Viewpoints

A Sampling of Views on the Economy, Financial Markets and Government Policy Excerpted from Recent Reports Issued by our Blue Chip Panel Members and Others

Gradual Likely, But Not Guaranteed

Markets in recent weeks have become more attuned to the possibility of the Fed beginning to lift rates before the end of the year. Following a more hawkish October FOMC statement and string of data that has showed the U.S. expansion is not giving way to weakness overseas, the market-based probability of a December move has risen to around 70 percent.

As liftoff looks more imminent, attention has turned to the eventual pace of tightening. There are certainly reasons to believe the Fed will move more slowly than previous cycles in the months ahead. First, a December move would place the Fed well ahead of other central banks in terms of policy normalization, leading to further appreciation in the already-strong dollar.

Second, potential GDP growth looks to have slowed due to weaker labor force growth and tepid productivity gains. The more cautious outlook on potential GDP suggests a lower long-run level for the fed funds rate, which means the FOMC would not have to raise rates as quickly to get the target rate back to neutral.

Third, Fed officials themselves have indicated a more gradual pace in public speeches, interviews and the "dot plot" (top chart). In the October meeting minutes, "participants generally agreed that it would probably be appropriate to remove policy accommodation gradually." Participants also noted that raising rates "relatively soon" would allow for the ultimate pace of tightening to be more shallow this cycle.

Even with a December liftoff looking increasingly likely, a more gradual pace of tightening is not guaranteed. In the previous two tightening cycles, the FOMC raised rates not only ahead of market expectations, but ahead of Fed staff projections as well. Yellen, along with St. Louis and Richmond Fed presidents James Bullard and Jeff Lacker, has also stressed the need for the path of policy tightening to also be flexible. With the markets, analysts and Fed officials nearly all expecting a historically gradual pace rate increases, the risks to the outlook for the fed funds path lies to the upside.

Economics Group, Wells Fargo, Charlotte, NC

U.S. Inflation: At Your Service(s)

U.S. inflation, as measured by the consumer price index, is barely visible. It was just 0.2% y/y in October, having spent all of this year within a tenth or two of zero. This run of near-zero inflation readings reflects the relatively-even tug of war between falling goods prices and rising services prices. Goods prices (37% of the CPI) were down 3.4% y/y in October, while services prices (a 63% weight) were up 2.4% y/y.

Lower energy costs account for around 83% of the fall in goods prices during the past year. WTI crude oil prices are down 45% y/y and a cumulative 62% since peaking above $107 in mid-2014, pulling down the price of gasoline (-27.8% y/y). The decline in this and other petroleum product costs applies downward pressure on other goods and services prices to the extent these petroleum products constitute a major input. For example, airline fares (a service) were down 5.2% y/y in October.

Another factor contributing to falling goods prices is a stronger U.S. dollar. The trade-weighted exchange rate, measured against the broad basket of currencies, has appreciated 12.3% over the past year and a cumulative 19.2% since hitting lows in mid-2014. This is dragging down the price of imported goods, which is evident in the CPI components where there is a relatively high import content. These include apparel (-1.9% y/y in October), recreation goods (-2.6% y/y), household furnishings and supplies (-1.4% y/y) and information technology goods (-7.4% y/y). These four import-heavy components alone account for about 15% of the fall in goods prices during the past year. And, to the extent imported items constitute a major input for other goods and services, or compete directly against domestically produced items, the dollar's downward pressure on prices ripples.

Higher rent and owners' equivalent rent (OER) account for around 68% of the rise in services prices over the past year. OER is an estimate of how much homeowners would have to pay to rent the house they currently live in. This is heavily influenced by actual rents in the local area and, indirectly, home prices. The latter are currently averaging around 5½% y/y and mildly accelerating, according to the S&P/Case-Shiller and FHFA home price indices. Actual rents rose 3.7% y/y in October, a pace that has also been drifting up. The rental vacancy rate was 7.3% in 2015:Q3, having bounced off a 30-year low (6.8%) in the prior period. The growth in demand for rental units has been outstripping the construction and conversion of new units, ratcheting up rents.

Excluding food and energy, the tug of war between core goods prices and core services prices tilts more to the services side. Core CPI inflation was 1.9% y/y in October, remaining within a tenth or two of 1.8% since the summer of 2012, as rising services prices have been checked (but not fully offset) by falling goods prices. Core goods prices (25% of the core CPI) were down 0.7% y/y in October, while core services prices (a 75% core weight) were up 2.8% y/y.

The grinding mild gain in core services inflation is more than just a rent/OER story. Firstly, these two shelter items account for a slightly smaller share of the annual change in core services prices (at 62.6%) than for total services prices (at 68.6%). Secondly, eyeballing the Consumer Price Index Press Release for October, one notices 3%-plus annual changes for many other core services items, particularly for those in which specialized or skilled labour is a key component, such as financial services, pet services including veterinary, child care, funeral expenses and medical care services. Traditionally, labour costs have been a key driver of core services prices.

The unemployment rate has been halved since peaking in the aftermath of the Great Recession (from 10.0% in October 2009 to 5.0% in October 2015), and now hovers in the FOMC's longer-run projection range (4.9%-to-5.2%). And, broader measures of labour market slack are now improving more quickly than the jobless rate. For example, the (U6) "underemployment" rate is now 9.8%, falling a full percentage point faster than the jobless rate over the past year (compared to 0.7 points in the year to October 2014 and only 0.1 points during the year before). In turn, wage pressures, even seen in average hourly earnings, are starting to sprout.

That some early signs of mounting wage pressures are coinciding with some early indications of faster-rising core services prices is no coincidence; the traditional wage-price dynamic appears to be once again taking root. Although it's early, this should help make the Fed feel "reasonably confident that inflation will move back to its 2 percent objective over the medium term."

Michael Gregory, BMO Capital Markets, Toronto, Canada

Long-Range Estimates:

The table below contains the results of our twice-annual long-range CONSENSUS survey. There are also Top 10 and Bottom 10 averages for each variable. Shown are consensus estimates for the years 2017 through 2021 and averages for the five-year periods 2017-2021 and 2022-2026. Apply these projections cautiously. Few if any economic, demographic and political forces can be evaluated accurately over such long time spans.

		-----------Average For The Year------------					Five-Year Averages	
Interest Rates		**2017**	**2018**	**2019**	**2020**	**2021**	**2017-2021**	**2022-2026**
1. Federal Funds Rate	**CONSENSUS**	**2.0**	**2.8**	**3.2**	**3.3**	**3.4**	**2.9**	**3.3**
	Top 10 Average	2.7	3.6	4.0	4.0	4.0	3.7	3.8
	Bottom 10 Average	1.4	2.1	2.3	2.4	2.7	2.2	2.7
2. Prime Rate	**CONSENSUS**	**5.0**	**5.8**	**6.2**	**6.4**	**6.4**	**6.0**	**6.3**
	Top 10 Average	5.7	6.5	7.0	7.1	7.0	6.7	6.8
	Bottom 10 Average	4.4	5.2	5.5	5.7	5.8	5.3	5.7
3. LIBOR, 3-Mo.	**CONSENSUS**	**2.3**	**3.1**	**3.3**	**3.4**	**3.6**	**3.1**	**3.5**
	Top 10 Average	2.8	3.7	4.0	4.2	4.1	3.8	4.0
	Bottom 10 Average	1.8	2.4	2.6	2.7	3.0	2.5	3.0
4. Commercial Paper, 1-Mo.	**CONSENSUS**	**2.2**	**3.0**	**3.4**	**3.5**	**3.4**	**3.1**	**3.4**
	Top 10 Average	2.6	3.5	3.9	4.1	4.0	3.6	3.8
	Bottom 10 Average	1.7	2.4	2.9	2.9	2.9	2.6	2.9
5. Treasury Bill Yield, 3-Mo.	**CONSENSUS**	**2.0**	**2.8**	**3.2**	**3.3**	**3.3**	**2.9**	**3.2**
	Top 10 Average	2.8	3.5	3.9	4.0	3.9	3.6	3.7
	Bottom 10 Average	1.4	2.1	2.5	2.7	2.7	2.3	2.6
6. Treasury Bill Yield, 6-Mo.	**CONSENSUS**	**2.1**	**2.9**	**3.3**	**3.4**	**3.4**	**3.0**	**3.3**
	Top 10 Average	3.0	3.6	4.0	4.1	4.0	3.7	3.8
	Bottom 10 Average	1.5	2.2	2.6	2.8	2.8	2.4	2.7
7. Treasury Bill Yield, 1-Yr.	**CONSENSUS**	**2.3**	**3.1**	**3.4**	**3.5**	**3.5**	**3.2**	**3.4**
	Top 10 Average	3.2	3.8	4.1	4.2	4.2	3.9	4.0
	Bottom 10 Average	1.6	2.3	2.7	2.9	2.9	2.5	2.8
8. Treasury Note Yield, 2-Yr.	**CONSENSUS**	**2.5**	**3.2**	**3.5**	**3.6**	**3.7**	**3.3**	**3.7**
	Top 10 Average	3.4	4.0	4.4	4.4	4.4	4.1	4.3
	Bottom 10 Average	1.8	2.4	2.6	2.7	3.0	2.5	3.0
10. Treasury Note Yield, 5-Yr.	**CONSENSUS**	**3.0**	**3.6**	**3.8**	**3.9**	**4.0**	**3.6**	**4.0**
	Top 10 Average	3.8	4.4	4.7	4.8	4.8	4.5	4.7
	Bottom 10 Average	2.3	2.7	2.8	2.9	3.2	2.8	3.3
11. Treasury Note Yield, 10-Yr.	**CONSENSUS**	**3.4**	**3.8**	**4.1**	**4.2**	**4.3**	**4.0**	**4.3**
	Top 10 Average	4.2	4.7	5.0	5.2	5.2	4.9	5.1
	Bottom 10 Average	2.8	2.9	3.0	3.2	3.5	3.1	3.5
12. Treasury Bond Yield, 30-Yr.	**CONSENSUS**	**4.0**	**4.4**	**4.6**	**4.8**	**4.9**	**4.5**	**4.8**
	Top 10 Average	4.9	5.3	5.7	5.9	5.9	5.5	5.7
	Bottom 10 Average	3.3	3.6	3.5	3.7	3.9	3.6	3.9
13. Corporate Aaa Bond Yield	**CONSENSUS**	**5.1**	**5.5**	**5.7**	**5.8**	**5.8**	**5.6**	**5.8**
	Top 10 Average	5.7	6.2	6.5	6.6	6.6	6.3	6.5
	Bottom 10 Average	4.5	4.9	5.0	5.0	4.9	4.9	5.2
13. Corporate Baa Bond Yield	**CONSENSUS**	**6.0**	**6.5**	**6.7**	**6.8**	**6.7**	**6.5**	**6.8**
	Top 10 Average	6.8	7.2	7.6	7.7	7.6	7.4	7.5
	Bottom 10 Average	5.2	5.7	5.9	6.0	5.8	5.7	6.0
14. State & Local Bonds Yield	**CONSENSUS**	**4.5**	**4.9**	**5.0**	**5.1**	**5.1**	**4.9**	**5.1**
	Top 10 Average	5.0	5.5	5.7	5.8	5.8	5.6	5.8
	Bottom 10 Average	4.0	4.3	4.3	4.4	4.4	4.3	4.4
15. Home Mortgage Rate	**CONSENSUS**	**5.1**	**5.6**	**5.8**	**5.9**	**6.0**	**5.7**	**6.0**
	Top 10 Average	5.8	6.3	6.7	6.8	6.8	6.5	6.7
	Bottom 10 Average	4.4	4.8	4.9	5.0	5.1	4.9	5.2
A. FRB - Major Currency Index	**CONSENSUS**	**92.8**	**91.7**	**91.2**	**90.8**	**91.1**	**91.5**	**90.1**
	Top 10 Average	96.9	96.6	96.4	96.4	96.4	96.5	96.0
	Bottom 10 Average	88.4	86.6	85.7	85.1	85.7	86.3	84.2

		----------Year-Over-Year, % Change----------					Five-Year Averages	
		2017	**2018**	**2019**	**2020**	**2021**	**2017-2021**	**2022-2026**
B. Real GDP	**CONSENSUS**	**2.5**	**2.4**	**2.2**	**2.2**	**2.3**	**2.3**	**2.2**
	Top 10 Average	2.9	2.8	2.6	2.6	2.6	2.7	2.5
	Bottom 10 Average	2.2	1.8	1.8	1.9	1.9	1.9	2.0
C. GDP Chained Price Index	**CONSENSUS**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.0**
	Top 10 Average	2.3	2.5	2.4	2.3	2.2	2.3	2.2
	Bottom 10 Average	1.8	1.8	1.9	1.9	1.9	1.9	1.9
D. Consumer Price Index	**CONSENSUS**	**2.3**	**2.4**	**2.3**	**2.3**	**2.3**	**2.3**	**2.2**
	Top 10 Average	2.8	2.8	2.7	2.6	2.5	2.7	2.5
	Bottom 10 Average	2.0	2.0	2.0	2.0	2.1	2.0	2.0

Databank:

2015 Historical Data

Monthly Indicator	Jan	Feb	Mar	Apr	May	Jun	Jly	Aug	Sep	Oct	Nov	Dec
Retail and Food Service Sales (a)	-0.8	-0.5	1.5	0.0	1.2	0.0	0.8	0.0	0.0	0.1		
Auto & Light Truck Sales (b)	16.63	16.32	17.06	16.70	17.63	16.95	17.47	17.73	18.06	18.12		
Personal Income (a, current $)	0.2	0.3	0.0	0.4	0.4	0.4	0.4	0.4	0.2	0.4		
Personal Consumption (a, current $)	-0.4	0.2	0.5	0.3	0.9	0.3	0.3	0.3	0.1	0.1		
Consumer Credit (e)	3.6	5.5	7.6	7.6	7.0	9.6	6.8	5.6	10.0			
Consumer Sentiment (U. of Mich.)	98.1	95.4	93.0	95.9	90.7	96.1	93.1	91.9	87.2	87.9		
Household Employment (c)	759	96	34	192	272	-56	101	196	-236	320		
Non-farm Payroll Employment (c)	201	266	119	187	260	245	223	153	137	271		
Unemployment Rate (%)	5.7	5.5	5.5	5.4	5.5	5.3	5.3	5.1	5.1	5.0		
Average Hourly Earnings (All, cur. $)	24.76	24.78	24.85	24.89	24.95	24.95	25.01	25.10	25.11	25.20		
Average Workweek (All, hrs.)	34.6	34.6	34.5	34.5	34.5	34.5	34.6	34.6	34.5	34.5		
Industrial Production (d)	4.5	3.5	2.4	2.1	1.4	1.0	1.3	1.4	0.7	0.4		
Capacity Utilization (%)	78.7	78.4	78.2	78.0	77.6	77.5	78.0	78.0	77.7	77.5		
ISM Manufacturing Index (g)	53.5	52.9	51.5	51.5	52.8	53.5	52.7	51.1	50.2	50.1		
ISM Non-Manufacturing Index (g)	56.7	56.9	56.5	57.8	55.7	56.0	60.3	59.0	56.9	59.1		
Housing Starts (b)	1.080	0.900	0.954	1.190	1.072	1.211	1.152	1.116	1.191	1.060		
Housing Permits (b)	1.059	1.098	1.038	1.140	1.250	1.337	1.130	1.161	1.105	1.150		
New Home Sales (1-family, c)	521	545	485	508	513	469	503	513	447	495		
Construction Expenditures (a)	-1.2	0.6	1.3	3.8	2.3	0.6	0.6	0.7	0.6			
Consumer Price Index (nsa., d)	-0.1	0.0	-0.1	-0.2	0.0	0.1	0.2	0.2	0.0	0.2		
CPI ex. Food and Energy (nsa., d)	1.6	1.7	1.8	1.8	1.7	1.8	1.8	1.8	1.9	1.9		
Producer Price Index (n.s.a., d)	0.0	-0.5	-0.9	-1.1	-0.8	-0.5	-0.8	-0.8	-1.1	-1.6		
Durable Goods Orders (a)	1.9	-3.5	5.1	-1.7	-2.3	4.1	1.9	-2.9	-0.8	3.0		
Leading Economic Indicators (g)	0.2	-0.2	0.4	0.6	0.6	0.6	0.0	-0.1	-0.1	0.6		
Balance of Trade & Services (f)	-42.4	-37.2	-50.6	-40.7	-42.5	-45.2	-41.8	-48.0	40.8			
Federal Funds Rate (%)	0.11	0.11	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.12		
3-Mo. Treasury Bill Rate (%)	0.03	0.02	0.03	0.02	0.02	0.02	0.03	0.07	0.02	0.02		
10-Year Treasury Note Yield (%)	1.88	1.98	2.04	1.94	2.20	2.36	2.32	2.17	2.17	2.07		

2014 Historical Data

Monthly Indicator	Jan	Feb	Mar	Apr	May	Jun	Jly	Aug	Sep	Oct	Nov	Dec
Retail and Food Service Sales (a)	-1.2	1.2	1.5	0.5	0.5	0.3	0.2	0.6	-0.3	0.4	0.5	-0.9
Auto & Light Truck Sales (b)	15.29	15.51	16.46	16.21	16.64	16.74	16.45	17.22	16.42	16.46	17.02	16.80
Personal Income (a, current $)	0.5	0.6	0.6	0.2	0.3	0.4	0.3	0.4	0.2	0.4	0.5	0.3
Personal Consumption (a, current $)	-0.2	0.4	0.8	0.2	0.3	0.5	0.2	0.6	0.2	0.4	0.3	-0.1
Consumer Credit (e)	5.2	5.9	7.5	9.5	7.3	7.1	8.5	5.0	6.2	5.8	5.3	6.7
Consumer Sentiment (U. of Mich.)	81.2	81.6	80.0	84.1	81.9	82.5	81.8	82.5	84.6	86.9	88.8	93.6
Household Employment (c)	535	95	495	-72	144	379	154	50	156	653	71	111
Non-Farm Payroll Employment (c)	166	188	225	330	236	286	249	213	250	221	423	329
Unemployment Rate (%)	6.6	6.7	6.6	6.2	6.3	6.1	6.2	6.1	5.9	5.7	5.8	5.6
Average Hourly Earnings (All, cur. $)	24.22	24.30	24.34	24.34	24.4	24.46	24.47	24.55	24.55	24.59	24.68	24.62
Average Workweek (All, hrs.)	34.4	34.4	34.5	34.5	34.5	34.5	34.5	34.5	34.5	34.6	34.6	34.6
Industrial Production (d)	2.1	2.5	3.1	3.3	3.6	3.9	4.7	4.0	4.0	4.0	4.8	4.6
Capacity Utilization (%)	76.8	77.3	77.8	77.8	78.0	78.2	78.3	78.2	785	78.5	79.0	79.0
ISM Manufacturing Index (g)	51.8	54.3	54.4	55.3	55.6	55.7	56.4	58.1	56.1	57.9	57.6	55.1
ISM Non-Manufacturing Index (g)	54.3	52.5	53.7	55.3	56.1	56.3	57.9	58.6	58.1	56.9	58.8	56.5
Housing Starts (b)	0.888	0.951	0.963	1.039	0.986	0.927	1.095	0.966	1.026	1.079	1.007	1.080
Housing Permits (b)	1.002	1.030	1.061	1.074	1.017	1.033	1.041	1.040	1.053	1.120	1.079	1.077
New Home Sales (1-family, c)	446	417	410	410	457	408	403	454	459	472	449	495
Construction Expenditures (a)	-0.4	0.4	0.0	1.4	1.3	-1.6	0.3	0.1	0.6	1.4	-0.6	0.8
Consumer Price Index (s.a., d)	1.6	1.1	1.5	2.0	2.1	2.1	2.0	1.7	1.7	1.7	1.3	0.8
CPI ex. Food and Energy (s.a., d)	1.6	1.6	1.7	1.8	2.0	1.9	1.9	1.7	1.7	1.8	1.7	1.6
Producer Price Index (n.s.a., d)	1.3	1.2	1.6	1.8	2.1	1.8	1.9	1.9	1.6	1.5	1.3	0.9
Durable Goods Orders (a)	-1.4	2.6	3.7	0.9	-0.9	2.7	22.5	-18.3	-0.7	0.3	-2.2	-3.7
Leading Economic Indicators (g)	-0.2	0.6	1.0	0.3	0.6	0.6	1.0	0.1	0.6	0.6	0.3	0.5
Balance of Trade & Services (f)	-39.5	-42.8	-43.1	-44.3	-42.1	-42.4	-41.4	-41.3	-43.2	-42.8	-40.0	-45.6
Federal Funds Rate (%)	0.07	0.07	0.08	0.09	0.09	0.10	0.09	0.09	0.09	0.09	0.09	0.12
3-Mo. Treasury Bill Rate (%)	0.04	0.05	0.05	0.03	0.03	0.04	0.03	0.03	0.02	0.02	0.02	0.03
10-Year Treasury Note Yield (%)	2.86	2.71	2.72	2.71	2.56	2.60	2.54	2.42	2.53	2.30	2.33	2.21

(a) month-over-month % change; (b) millions, saar; (c) month-over-month change, thousands; (d) year-over-year % change; (e) annualized % change; (f) $ billions; (g) level. Most series are subject to frequent government revisions. Use with care.

Calendar Of Upcoming Economic Data Releases

Monday	Tuesday	Wednesday	Thursday	Friday
November 30 Chicago PMI (Nov) Pending Home Sales (Oct) Dallas Fed Survey (Nov)	**December 1** Markit Manufacturing PMI (Nov, Final) ISM Manufacturing (Nov) Light Vehicle Sales (Nov) Construction Spending (Oct)	**2** ADP Employment (Nov) Productivity and Costs (Q3, Revised) Beige Book EIA Crude Oil Stocks Mortgage Applications	**3** ISM Manufacturing (Nov) Markit Services PMI (Nov, Final) Factory Orders (Oct) Weekly Jobless Claims Weekly Money Supply	**4** Employment (Nov) International Trade (Oct)
7 Consumer Credit (Oct)	**8** NFIB Survey (Nov) JOLTS (Oct)	**9** Wholesale Trade (Oct) EIA Crude Oil Stocks Mortgage Applications	**10** Imports Prices (Nov) Quarterly Services Survey (Q3) Federal Budget (Nov) Weekly Jobless Claims Weekly Money Supply	**11** Consumer Sentiment (Dec, Preliminary, University of Michigan) Retail Sales (Nov) Producer Price Index (Nov) Business Inventories (Oct)
14	**15** **FOMC Meeting** Consumer Price Index (Nov) Empire State Survey (Dec) NABH Survey (Dec) TIC Data (Oct)	**16** **FOMC Meeting** **Statement and Projections** **2:00 p.m.** **Press conference** **2:30 p.m.** Industrial Production (Nov) Housing Starts (Nov) Manufacturing PMI (Dec, Flash) EIA Crude Oil Stocks	**17** Philadelphia Fed Survey (Dec) Current Account (Q3) Weekly Jobless Claims Weekly Money Supply	**18** Markit Services PMI (Dec, Flash) Kansas City Fed Survey (Dec)
21	**22** Real GDP (Q3, Third estimate) Richmond Fed Survey (Dec) Existing Home Sales (Nov) FHFA Home Price Index (Oct)	**23** Durable Goods (Nov) New Home Sales (Nov) Consumer Sentiment (Dec, Final, University of Michigan) Consumer Sentiment (EIA Crude Oil Stocks Mortgage Applications	**24** Weekly Jobless Claims Weekly Money Supply	**25** **Christmas Day** **Bond and Stock Markets Closed**
28 Dallas Fed Survey (Dec)	**29** S&P/Case-Shiller Home Price Index (Oct) Consumer Confidence (Dec, Conference Board)	**30** Pending Home Sales (Nov) EIA Crude Oil Stocks Mortgage Applications	**31** Chicago PMI (Dec) Weekly Jobless Claims Weekly Money Supply	**January 1** **New Year's Day** **Bond and Stock Markets Closed**
4 ISM Manufacturing (Dec) Markit Manufacturing PMI (Dec, Final) Construction Spending (Nov)	**5** Vehicle Sales (Dec)	**6** ADP Employment (Dec) International Trade (Nov) ISM Non-Manufacturing (Dec) Markit Services PMI (Dec, Final) Factory Orders (Nov) FOMC Minutes EIA Crude Oil Stocks Mortgage Applications	**7** Chain Store Sales (Dec) Challenger Job Cut Report Weekly Jobless Claims Weekly Money Supply	**8** Employment Report (Dec) Wholesale Trade (Nov) Consumer Credit (Nov)

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Table A-1

Large-Capitalization Stocks: Total Returns

from January 1926 to December 1970

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Jan–Dec*
1926	0.0000	-0.0385	-0.0575	0.0253	0.0179	0.0457	0.0479	0.0248	0.0252	-0.0284	0.0347	0.0196	1926	0.1162
1927	-0.0193	0.0537	0.0087	0.0201	0.0607	-0.0067	0.0670	0.0515	0.0450	-0.0502	0.0721	0.0279	1927	0.3749
1928	-0.0040	-0.0125	0.1101	0.0345	0.0197	-0.0385	0.0141	0.0803	0.0259	0.0168	0.1292	0.0049	1928	0.4361
1929	0.0583	-0.0019	-0.0012	0.0176	-0.0362	0.1140	0.0471	0.1028	-0.0476	-0.1973	-0.1246	0.0282	1929	-0.0842
1930	0.0639	0.0259	0.0812	-0.0080	-0.0096	-0.1625	0.0386	0.0141	-0.1282	-0.0855	-0.0089	-0.0706	1930	-0.2490
1931	0.0502	0.1193	-0.0675	-0.0935	-0.1279	0.1421	-0.0722	0.0182	-0.2973	0.0896	-0.0798	-0.1400	1931	-0.4334
1932	-0.0271	0.0570	-0.1158	-0.1997	-0.2196	-0.0022	0.3815	0.3869	-0.0346	-0.1349	-0.0417	0.0565	1932	-0.0819
1933	0.0087	-0.1772	0.0353	0.4256	0.1683	0.1338	-0.0862	0.1206	-0.1118	-0.0855	0.1127	0.0253	1933	0.5399
1934	0.1069	-0.0322	0.0000	-0.0251	-0.0736	0.0229	-0.1132	0.0611	-0.0033	-0.0286	0.0942	-0.0010	1934	-0.0144
1935	-0.0411	-0.0341	-0.0286	0.0980	0.0409	0.0699	0.0850	0.0280	0.0256	0.0777	0.0474	0.0394	1935	0.4767
1936	0.0670	0.0224	0.0268	-0.0751	0.0545	0.0333	0.0701	0.0151	0.0031	0.0775	0.0134	-0.0029	1936	0.3392
1937	0.0390	0.0191	-0.0077	-0.0809	-0.0024	-0.0504	0.1045	-0.0483	-0.1403	-0.0981	-0.0866	-0.0459	1937	-0.3503
1938	0.0152	0.0674	-0.2487	0.1447	-0.0330	0.2503	0.0744	-0.0226	0.0166	0.0776	-0.0273	0.0401	1938	0.3112
1939	-0.0674	0.0390	-0.1339	-0.0027	0.0733	-0.0612	0.1105	-0.0648	0.1673	-0.0123	-0.0398	0.0270	1939	-0.0041
1940	-0.0336	0.0133	0.0124	-0.0024	-0.2289	0.0809	0.0341	0.0350	0.0123	0.0422	-0.0316	0.0009	1940	-0.0978
1941	-0.0463	-0.0060	0.0071	-0.0612	0.0183	0.0578	0.0579	0.0010	-0.0068	-0.0657	-0.0284	-0.0407	1941	-0.1159
1942	0.0161	-0.0159	-0.0652	-0.0400	0.0796	0.0221	0.0337	0.0164	0.0290	0.0678	-0.0021	0.0549	1942	0.2034
1943	0.0737	0.0583	0.0545	0.0035	0.0552	0.0223	-0.0526	0.0171	0.0263	-0.0108	-0.0654	0.0617	1943	0.2590
1944	0.0171	0.0042	0.0195	-0.0100	0.0505	0.0543	-0.0193	0.0157	-0.0008	0.0023	0.0133	0.0374	1944	0.1975
1945	0.0158	0.0683	-0.0441	0.0902	0.0195	-0.0007	-0.0180	0.0641	0.0438	0.0322	0.0396	0.0116	1945	0.3644
1946	0.0714	-0.0641	0.0480	0.0393	0.0288	-0.0370	-0.0239	-0.0674	-0.0997	-0.0060	-0.0027	0.0457	1946	-0.0807
1947	0.0255	-0.0077	-0.0149	-0.0363	0.0014	0.0554	0.0381	-0.0203	-0.0111	0.0238	-0.0175	0.0233	1947	0.0571
1948	-0.0379	-0.0388	0.0793	0.0292	0.0879	0.0054	-0.0508	0.0158	-0.0276	0.0710	-0.0961	0.0346	1948	0.0550
1949	0.0039	-0.0296	0.0328	-0.0179	-0.0258	0.0014	0.0650	0.0219	0.0263	0.0340	0.0175	0.0486	1949	0.1879
1950	0.0197	0.0199	0.0070	0.0486	0.0509	-0.0548	0.0119	0.0443	0.0592	0.0093	0.0169	0.0513	1950	0.3171
1951	0.0637	0.0157	-0.0156	0.0509	-0.0299	-0.0228	0.0711	0.0478	0.0013	-0.0103	0.0096	0.0424	1951	0.2402
1952	0.0181	-0.0282	0.0503	-0.0402	0.0343	0.0490	0.0196	-0.0071	-0.0176	0.0020	0.0571	0.0382	1952	0.1837
1953	-0.0049	-0.0106	-0.0212	-0.0237	0.0077	-0.0134	0.0273	-0.0501	0.0034	0.0540	0.0204	0.0053	1953	-0.0099
1954	0.0536	0.0111	0.0325	0.0516	0.0418	0.0031	0.0589	-0.0275	0.0851	-0.0167	0.0909	0.0534	1954	0.5262
1955	0.0197	0.0098	-0.0030	0.0396	0.0055	0.0841	0.0622	-0.0025	0.0130	-0.0284	0.0827	0.0015	1955	0.3156
1956	-0.0347	0.0413	0.0710	-0.0004	-0.0593	0.0409	0.0530	-0.0328	-0.0440	0.0066	-0.0050	0.0370	1956	0.0656
1957	-0.0401	-0.0264	0.0215	0.0388	0.0437	0.0004	0.0131	-0.0505	-0.0602	-0.0302	0.0231	-0.0395	1957	-0.1078
1958	0.0445	-0.0141	0.0328	0.0337	0.0212	0.0279	0.0449	0.0176	0.0501	0.0270	0.0284	0.0535	1958	0.4336
1959	0.0053	0.0049	0.0020	0.0402	0.0240	-0.0022	0.0363	-0.0102	-0.0443	0.0128	0.0186	0.0292	1959	0.1196
1960	-0.0700	0.0147	-0.0123	-0.0161	0.0326	0.0211	-0.0234	0.0317	-0.0590	-0.0007	0.0465	0.0479	1960	0.0047
1961	0.0645	0.0319	0.0270	0.0051	0.0239	-0.0275	0.0342	0.0243	-0.0184	0.0298	0.0447	0.0046	1961	0.2689
1962	-0.0366	0.0209	-0.0046	-0.0607	-0.0811	-0.0803	0.0652	0.0208	-0.0465	0.0064	0.1086	0.0153	1962	-0.0873
1963	0.0506	-0.0239	0.0370	0.0500	0.0193	-0.0188	-0.0022	0.0535	-0.0097	0.0339	-0.0046	0.0262	1963	0.2280
1964	0.0283	0.0147	0.0165	0.0075	0.0162	0.0178	0.0195	-0.0118	0.0301	0.0096	0.0005	0.0056	1964	0.1648
1965	0.0345	0.0031	-0.0133	0.0356	-0.0030	-0.0473	0.0147	0.0272	0.0334	0.0289	-0.0031	0.0106	1965	0.1245
1966	0.0062	-0.0131	-0.0205	0.0220	-0.0492	-0.0146	-0.0120	-0.0725	-0.0053	0.0494	0.0095	0.0002	1966	-0.1006
1967	0.0798	0.0072	0.0409	0.0437	-0.0477	0.0190	0.0468	-0.0070	0.0342	-0.0276	0.0065	0.0278	1967	0.2398
1968	-0.0425	-0.0261	0.0110	0.0834	0.0161	0.0105	-0.0172	0.0164	0.0400	0.0087	0.0531	-0.0402	1968	0.1106
1969	-0.0068	-0.0426	0.0359	0.0229	0.0026	-0.0542	-0.0587	0.0454	-0.0236	0.0459	-0.0297	-0.0177	1969	-0.0850
1970	-0.0743	0.0557	0.0044	-0.0875	-0.0578	-0.0466	0.0769	0.0478	0.0362	-0.0083	0.0506	0.0598	1970	0.0386

*Compound annual return

from January 1971 to December 2014

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Jan–Dec*
1971	0.0432	0.0117	0.0394	0.0389	-0.0391	0.0033	-0.0387	0.0388	-0.0044	-0.0391	0.0002	0.0888	1971	0.1430
1972	0.0206	0.0277	0.0083	0.0068	0.0197	-0.0194	0.0048	0.0369	-0.0025	0.0119	0.0481	0.0142	1972	0.1899
1973	-0.0149	-0.0352	0.0008	-0.0383	-0.0163	-0.0040	0.0407	-0.0341	0.0427	0.0017	-0.1109	0.0198	1973	-0.1469
1974	-0.0072	-0.0007	-0.0205	-0.0359	-0.0302	-0.0114	-0.0742	-0.0864	-0.1152	0.1681	-0.0489	-0.0156	1974	-0.2647
1975	0.1272	0.0638	0.0254	0.0510	0.0476	0.0477	-0.0644	-0.0176	-0.0312	0.0653	0.0282	-0.0081	1975	0.3723
1976	0.1217	-0.0084	0.0337	-0.0078	-0.0111	0.0443	-0.0048	-0.0018	0.0258	-0.0186	-0.0041	0.0561	1976	0.2393
1977	-0.0473	-0.0182	-0.0105	0.0042	-0.0196	0.0494	-0.0124	-0.0172	0.0015	-0.0389	0.0316	0.0075	1977	-0.0716
1978	-0.0574	-0.0203	0.0294	0.0902	0.0092	-0.0138	0.0583	0.0301	-0.0032	-0.0872	0.0215	0.0196	1978	0.0657
1979	0.0443	-0.0321	0.0596	0.0094	-0.0247	0.0435	0.0134	0.0577	0.0043	-0.0640	0.0475	0.0214	1979	0.1861
1980	0.0622	-0.0001	-0.0972	0.0462	0.0515	0.0316	0.0696	0.0101	0.0294	0.0202	0.1065	-0.0302	1980	0.3250
1981	-0.0418	0.0174	0.0400	-0.0193	0.0026	-0.0063	0.0021	-0.0577	-0.0493	0.0540	0.0413	-0.0256	1981	-0.0492
1982	-0.0131	-0.0559	-0.0052	0.0452	-0.0341	-0.0150	-0.0178	0.1214	0.0125	0.1151	0.0404	0.0193	1982	0.2155
1983	0.0372	0.0229	0.0369	0.0788	-0.0087	0.0389	-0.0295	0.0150	0.0138	-0.0116	0.0211	-0.0052	1983	0.2256
1984	-0.0056	-0.0352	0.0173	0.0095	-0.0554	0.0217	-0.0124	0.1104	0.0002	0.0039	-0.0112	0.0263	1984	0.0627
1985	0.0779	0.0122	0.0007	-0.0009	0.0578	0.0157	-0.0015	-0.0085	-0.0313	0.0462	0.0686	0.0484	1985	0.3173
1986	0.0056	0.0747	0.0558	-0.0113	0.0532	0.0169	-0.0559	0.0742	-0.0827	0.0577	0.0243	-0.0255	1986	0.1867
1987	0.1347	0.0395	0.0289	-0.0089	0.0087	0.0505	0.0507	0.0373	-0.0219	-0.2154	-0.0824	0.0761	1987	0.0525
1988	0.0421	0.0466	-0.0309	0.0111	0.0086	0.0459	-0.0038	-0.0339	0.0426	0.0278	-0.0143	0.0174	1988	0.1661
1989	0.0732	-0.0249	0.0233	0.0519	0.0405	-0.0057	0.0903	0.0195	-0.0041	-0.0232	0.0204	0.0240	1989	0.3169
1990	-0.0671	0.0129	0.0265	-0.0249	0.0975	-0.0067	-0.0032	-0.0904	-0.0487	-0.0043	0.0646	0.0279	1990	-0.0310
1991	0.0436	0.0715	0.0242	0.0024	0.0431	-0.0458	0.0466	0.0237	-0.0167	0.0134	-0.0403	0.1144	1991	0.3047
1992	-0.0186	0.0130	-0.0194	0.0294	0.0049	-0.0149	0.0409	-0.0205	0.0118	0.0035	0.0341	0.0123	1992	0.0762
1993	0.0084	0.0136	0.0211	-0.0242	0.0268	0.0029	-0.0040	0.0379	-0.0077	0.0207	-0.0095	0.0121	1993	0.1008
1994	0.0340	-0.0271	-0.0436	0.0128	0.0164	-0.0245	0.0328	0.0410	-0.0245	0.0225	-0.0364	0.0148	1994	0.0132
1995	0.0259	0.0390	0.0295	0.0294	0.0400	0.0232	0.0332	0.0025	0.0422	-0.0036	0.0439	0.0193	1995	0.3758
1996	0.0340	0.0093	0.0096	0.0147	0.0258	0.0038	-0.0442	0.0211	0.0563	0.0276	0.0756	-0.0198	1996	0.2296
1997	0.0625	0.0078	-0.0411	0.0597	0.0609	0.0448	0.0796	-0.0560	0.0548	-0.0334	0.0463	0.0172	1997	0.3336
1998	0.0111	0.0721	0.0512	0.0101	-0.0172	0.0406	-0.0106	-0.1446	0.0641	0.0813	0.0606	0.0576	1998	0.2858
1999	0.0418	-0.0311	0.0400	0.0387	-0.0236	0.0555	-0.0312	-0.0049	-0.0274	0.0633	0.0203	0.0589	1999	0.2104
2000	-0.0502	-0.0189	0.0978	-0.0301	-0.0205	0.0247	-0.0156	0.0621	-0.0528	-0.0042	-0.0788	0.0049	2000	-0.0910
2001	0.0355	-0.0912	-0.0634	0.0777	0.0067	-0.0243	-0.0098	-0.0626	-0.0808	0.0191	0.0767	0.0088	2001	-0.1189
2002	-0.0146	-0.0193	0.0376	-0.0606	-0.0074	-0.0712	-0.0780	0.0066	-0.1087	0.0880	0.0589	-0.0587	2002	-0.2210
2003	-0.0262	-0.0150	0.0097	0.0824	0.0527	0.0128	0.0176	0.0195	-0.0106	0.0566	0.0088	0.0524	2003	0.2868
2004	0.0184	0.0139	-0.0151	-0.0157	0.0137	0.0194	-0.0331	0.0040	0.0108	0.0153	0.0405	0.0340	2004	0.1088
2005	-0.0244	0.0210	-0.0177	-0.0190	0.0318	0.0014	0.0372	-0.0091	0.0081	-0.0167	0.0378	0.0003	2005	0.0491
2006	0.0265	0.0027	0.0124	0.0134	-0.0288	0.0014	0.0062	0.0238	0.0258	0.0326	0.0190	0.0140	2006	0.1579
2007	0.0151	-0.0196	0.0112	0.0443	0.0349	-0.0166	-0.0310	0.0150	0.0374	0.0159	-0.0418	-0.0069	2007	0.0549
2008	-0.0600	-0.0325	-0.0043	0.0487	0.0130	-0.0843	-0.0084	0.0145	-0.0891	-0.1679	-0.0718	0.0106	2008	-0.3700
2009	-0.0843	-0.1065	0.0876	0.0957	0.0559	0.0020	0.0756	0.0361	0.0373	-0.0186	0.0600	0.0193	2009	0.2646
2010	-0.0360	0.0310	0.0603	0.0158	-0.0799	-0.0523	0.0701	-0.0451	0.0892	0.0380	0.0001	0.0668	2010	0.1506
2011	0.0237	0.0343	0.0004	0.0296	-0.0113	-0.0167	-0.0203	-0.0543	-0.0703	0.1093	-0.0022	0.0102	2011	0.0211
2012	0.0448	0.0432	0.0329	-0.0063	-0.0601	0.0412	0.0139	0.0225	0.0258	-0.0185	0.0058	0.0091	2012	0.1600
2013	0.0518	0.0136	0.0375	0.0193	0.0234	-0.0134	0.0509	-0.0290	0.0314	0.0460	0.0305	0.0253	2013	0.3239
2014	-0.0346	0.0457	0.0084	0.0074	0.0235	0.0207	-0.0138	0.0400	-0.0140	0.0244	0.0269	-0.0025	2014	0.1369

*Compound annual return

Table A-5

Long-Term Corporate Bonds: Total Returns

from January 1926 to December 1970

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Jan–Dec*
1926	0.0072	0.0045	0.0084	0.0097	0.0044	0.0004	0.0057	0.0044	0.0057	0.0097	0.0057	0.0056	1926	0.0737
1927	0.0056	0.0069	0.0083	0.0055	-0.0011	0.0043	0.0003	0.0083	0.0149	0.0055	0.0068	0.0068	1927	0.0744
1928	0.0027	0.0068	0.0041	0.0014	-0.0078	-0.0024	-0.0010	0.0083	0.0030	0.0083	-0.0036	0.0084	1928	0.0284
1929	0.0043	0.0030	-0.0087	0.0019	0.0045	-0.0046	0.0020	0.0020	0.0034	0.0073	-0.0018	0.0192	1929	0.0327
1930	0.0059	0.0072	0.0138	0.0084	0.0057	0.0110	0.0056	0.0136	0.0108	0.0054	-0.0012	-0.0090	1930	0.0798
1931	0.0203	0.0068	0.0094	0.0067	0.0134	0.0052	0.0052	0.0012	-0.0014	-0.0363	-0.0189	-0.0286	1931	-0.0185
1932	-0.0052	-0.0238	0.0356	-0.0176	0.0107	-0.0009	0.0043	0.0436	0.0301	0.0074	0.0073	0.0139	1932	0.1082
1933	0.0547	-0.0523	0.0047	-0.0095	0.0588	0.0190	0.0161	0.0093	-0.0014	0.0040	-0.0248	0.0257	1933	0.1038
1934	0.0257	0.0146	0.0187	0.0104	0.0090	0.0158	0.0047	0.0047	-0.0061	0.0102	0.0129	0.0101	1934	0.1384
1935	0.0211	0.0141	0.0043	0.0112	0.0042	0.0112	0.0111	-0.0042	0.0000	0.0042	0.0069	0.0083	1935	0.0961
1936	0.0082	0.0054	0.0082	0.0026	0.0040	0.0082	0.0011	0.0067	0.0067	0.0025	0.0109	0.0010	1936	0.0674
1937	0.0024	-0.0046	-0.0114	0.0068	0.0040	0.0053	0.0039	-0.0017	0.0025	0.0067	0.0067	0.0067	1937	0.0275
1938	0.0038	0.0010	-0.0087	0.0138	0.0010	0.0095	0.0066	-0.0019	0.0109	0.0080	0.0037	0.0122	1938	0.0613
1939	0.0022	0.0064	0.0022	0.0064	0.0049	0.0035	-0.0007	-0.0392	0.0151	0.0237	0.0079	0.0078	1939	0.0397
1940	0.0049	0.0021	0.0049	-0.0092	-0.0021	0.0121	0.0021	0.0007	0.0092	0.0049	0.0063	-0.0023	1940	0.0339
1941	0.0006	0.0006	-0.0022	0.0078	0.0049	0.0063	0.0063	0.0034	0.0048	0.0034	-0.0094	0.0006	1941	0.0273
1942	0.0006	-0.0008	0.0063	0.0006	0.0020	0.0034	0.0020	0.0035	0.0020	0.0006	0.0006	0.0049	1942	0.0260
1943	0.0049	0.0006	0.0020	0.0049	0.0048	0.0048	0.0019	0.0019	0.0005	-0.0009	-0.0023	0.0049	1943	0.0283
1944	0.0020	0.0034	0.0048	0.0034	0.0005	0.0020	0.0034	0.0034	0.0019	0.0019	0.0048	0.0149	1944	0.0473
1945	0.0076	0.0046	0.0018	0.0018	-0.0011	0.0032	-0.0011	0.0004	0.0032	0.0032	0.0032	0.0133	1945	0.0408
1946	0.0128	0.0034	0.0034	-0.0043	0.0019	0.0019	-0.0012	-0.0088	-0.0026	0.0020	-0.0025	0.0113	1946	0.0172
1947	0.0005	0.0005	0.0067	0.0020	0.0020	0.0004	0.0020	-0.0071	-0.0131	-0.0099	-0.0098	0.0024	1947	-0.0234
1948	0.0024	0.0039	0.0115	0.0038	0.0008	-0.0083	-0.0052	0.0055	0.0024	0.0024	0.0085	0.0131	1948	0.0414
1949	0.0038	0.0038	0.0007	0.0023	0.0038	0.0084	0.0099	0.0037	0.0021	0.0067	0.0021	-0.0145	1949	0.0331
1950	0.0037	0.0007	0.0022	-0.0008	-0.0008	0.0023	0.0069	0.0038	-0.0039	-0.0008	0.0054	0.0023	1950	0.0212
1951	0.0019	-0.0044	-0.0237	-0.0009	-0.0015	-0.0093	0.0205	0.0114	-0.0057	-0.0145	-0.0061	0.0058	1951	-0.0269
1952	0.0199	-0.0085	0.0076	-0.0004	0.0031	0.0016	0.0016	0.0063	-0.0018	0.0039	0.0108	-0.0091	1952	0.0352
1953	-0.0080	-0.0040	-0.0033	-0.0248	-0.0030	0.0109	0.0177	-0.0085	0.0253	0.0227	-0.0073	0.0172	1953	0.0341
1954	0.0124	0.0198	0.0039	-0.0034	-0.0042	0.0063	0.0040	0.0018	0.0040	0.0040	0.0025	0.0017	1954	0.0539
1955	-0.0097	-0.0063	0.0092	-0.0001	-0.0018	0.0029	-0.0041	-0.0038	0.0076	0.0078	-0.0030	0.0063	1955	0.0048
1956	0.0104	0.0026	-0.0146	-0.0115	0.0052	-0.0018	-0.0093	-0.0208	0.0012	-0.0105	-0.0126	-0.0082	1956	-0.0681
1957	0.0197	0.0093	0.0050	-0.0066	-0.0075	-0.0322	-0.0110	-0.0009	0.0095	0.0023	0.0311	0.0685	1957	0.0871
1958	0.0099	-0.0008	-0.0046	0.0163	0.0031	-0.0038	-0.0153	-0.0320	-0.0096	0.0107	0.0105	-0.0058	1958	-0.0222
1959	-0.0028	0.0126	-0.0083	-0.0172	-0.0114	0.0044	0.0089	-0.0068	-0.0088	0.0165	0.0135	-0.0096	1959	-0.0097
1960	0.0107	0.0128	0.0191	-0.0022	-0.0021	0.0141	0.0257	0.0117	-0.0063	0.0008	-0.0070	0.0104	1960	0.0907
1961	0.0148	0.0210	-0.0029	-0.0116	0.0049	-0.0080	0.0040	-0.0018	0.0144	0.0127	0.0028	-0.0026	1961	0.0482
1962	0.0080	0.0052	0.0151	0.0142	0.0000	-0.0026	-0.0015	0.0143	0.0089	0.0068	0.0062	0.0023	1962	0.0795
1963	0.0059	0.0023	0.0026	-0.0051	0.0048	0.0043	0.0028	0.0035	-0.0023	0.0049	0.0015	-0.0034	1963	0.0219
1964	0.0087	0.0054	-0.0062	0.0040	0.0057	0.0048	0.0052	0.0037	0.0021	0.0050	-0.0004	0.0088	1964	0.0477
1965	0.0081	0.0009	0.0012	0.0021	-0.0008	0.0003	0.0019	-0.0006	-0.0015	0.0046	-0.0057	-0.0149	1965	-0.0046
1966	0.0022	-0.0113	-0.0059	0.0013	-0.0026	0.0030	-0.0098	-0.0259	0.0078	0.0261	-0.0020	0.0201	1966	0.0020
1967	0.0450	-0.0201	0.0117	-0.0071	-0.0254	-0.0223	0.0041	-0.0007	0.0094	-0.0281	-0.0272	0.0127	1967	-0.0495
1968	0.0361	0.0037	-0.0197	0.0048	0.0032	0.0122	0.0341	0.0206	-0.0053	-0.0160	-0.0226	-0.0233	1968	0.0257
1969	0.0139	-0.0160	-0.0200	0.0335	-0.0227	0.0035	0.0005	-0.0020	-0.0244	0.0127	-0.0471	-0.0134	1969	-0.0809
1970	0.0141	0.0401	-0.0045	-0.0250	-0.0163	0.0001	0.0556	0.0100	0.0139	-0.0096	0.0584	0.0372	1970	0.1837

*Compound annual return

Table A-5 (Continued)

Long-Term Corporate Bonds: Total Returns

from January 1971 to December 2014

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Jan–Dec*
1971	0.0532	-0.0366	0.0258	-0.0236	-0.0161	0.0107	-0.0025	0.0554	-0.0102	0.0282	0.0029	0.0223	1971	0.1101
1972	-0.0033	0.0107	0.0024	0.0035	0.0163	-0.0068	0.0030	0.0072	0.0031	0.0101	0.0249	-0.0004	1972	0.0726
1973	-0.0054	0.0023	0.0045	0.0061	-0.0039	-0.0056	-0.0476	0.0356	0.0356	-0.0066	0.0078	-0.0089	1973	0.0114
1974	-0.0053	0.0009	-0.0307	-0.0341	0.0105	-0.0285	-0.0211	-0.0268	0.0174	0.0885	0.0117	-0.0075	1974	-0.0306
1975	0.0596	0.0137	-0.0247	-0.0052	0.0106	0.0304	-0.0030	-0.0175	-0.0126	0.0553	-0.0088	0.0442	1975	0.1464
1976	0.0188	0.0061	0.0167	-0.0015	-0.0103	0.0150	0.0149	0.0231	0.0167	0.0070	0.0319	0.0347	1976	0.1865
1977	-0.0303	-0.0020	0.0094	0.0100	0.0106	0.0175	-0.0005	0.0136	-0.0022	-0.0038	0.0061	-0.0105	1977	0.0171
1978	-0.0089	0.0051	0.0042	-0.0023	-0.0108	0.0023	0.0101	0.0257	-0.0048	-0.0205	0.0134	-0.0133	1978	-0.0007
1979	0.0184	-0.0128	0.0107	-0.0052	0.0228	0.0269	-0.0031	0.0006	-0.0179	-0.0890	0.0222	-0.0108	1979	-0.0418
1980	-0.0645	-0.0665	-0.0062	0.1376	0.0560	0.0341	-0.0429	-0.0445	-0.0237	-0.0159	0.0017	0.0248	1980	-0.0276
1981	-0.0130	-0.0269	0.0311	-0.0769	0.0595	0.0023	-0.0372	-0.0345	-0.0199	0.0521	0.1267	-0.0580	1981	-0.0124
1982	-0.0129	0.0312	0.0306	0.0338	0.0245	-0.0468	0.0540	0.0837	0.0623	0.0759	0.0201	0.0108	1982	0.4256
1983	-0.0094	0.0428	0.0072	0.0548	-0.0324	-0.0046	-0.0455	0.0051	0.0392	-0.0025	0.0142	-0.0033	1983	0.0626
1984	0.0270	-0.0172	-0.0235	-0.0073	-0.0483	0.0199	0.0586	0.0307	0.0314	0.0572	0.0212	0.0128	1984	0.1686
1985	0.0325	-0.0373	0.0179	0.0296	0.0820	0.0083	-0.0121	0.0260	0.0071	0.0329	0.0370	0.0469	1985	0.3009
1986	0.0045	0.0752	0.0256	0.0016	-0.0164	0.0218	0.0031	0.0275	-0.0114	0.0189	0.0233	0.0117	1986	0.1985
1987	0.0216	0.0058	-0.0087	-0.0502	-0.0052	0.0155	-0.0119	-0.0075	-0.0422	0.0507	0.0125	0.0212	1987	-0.0027
1988	0.0517	0.0138	-0.0188	-0.0149	-0.0057	0.0379	-0.0111	0.0054	0.0326	0.0273	-0.0169	0.0039	1988	0.1070
1989	0.0202	-0.0129	0.0064	0.0213	0.0379	0.0395	0.0178	-0.0163	0.0040	0.0276	0.0070	0.0006	1989	0.1623
1990	-0.0191	-0.0012	-0.0011	-0.0191	0.0385	0.0216	0.0102	-0.0292	0.0091	0.0132	0.0285	0.0167	1990	0.0678
1991	0.0150	0.0121	0.0108	0.0138	0.0039	-0.0018	0.0167	0.0275	0.0271	0.0043	0.0106	0.0436	1991	0.1989
1992	-0.0173	0.0096	-0.0073	0.0016	0.0254	0.0156	0.0308	0.0090	0.0099	-0.0156	0.0069	0.0228	1992	0.0939
1993	0.0250	0.0256	0.0025	0.0052	0.0020	0.0293	0.0100	0.0287	0.0043	0.0051	-0.0188	0.0067	1993	0.1319
1994	0.0202	-0.0286	-0.0383	-0.0097	-0.0062	-0.0081	0.0309	-0.0031	-0.0265	-0.0050	0.0018	0.0157	1994	-0.0576
1995	0.0256	0.0289	0.0095	0.0175	0.0631	0.0079	-0.0101	0.0214	0.0153	0.0185	0.0242	0.0228	1995	0.2720
1996	0.0014	-0.0373	-0.0130	-0.0160	0.0005	0.0172	0.0010	-0.0070	0.0259	0.0361	0.0263	-0.0186	1996	0.0140
1997	-0.0028	0.0028	-0.0221	0.0184	0.0128	0.0187	0.0528	-0.0240	0.0226	0.0191	0.0101	0.0163	1997	0.1295
1998	0.0137	-0.0007	0.0038	0.0053	0.0167	0.0115	-0.0056	0.0089	0.0413	-0.0190	0.0270	0.0010	1998	0.1076
1999	0.0123	-0.0401	0.0002	-0.0024	-0.0176	-0.0160	-0.0113	-0.0026	0.0093	0.0047	-0.0024	-0.0102	1999	-0.0745
2000	-0.0021	0.0092	0.0169	-0.0115	-0.0161	0.0326	0.0179	0.0135	0.0046	0.0045	0.0263	0.0270	2000	0.1287
2001	0.0359	0.0127	-0.0029	-0.0128	0.0132	0.0055	0.0361	0.0157	-0.0152	0.0437	-0.0188	-0.0090	2001	0.1065
2002	0.0175	0.0130	-0.0295	0.0253	0.0113	0.0073	0.0094	0.0452	0.0330	-0.0240	0.0103	0.0361	2002	0.1633
2003	0.0021	0.0264	-0.0080	0.0229	0.0471	-0.0143	-0.0881	0.0219	0.0503	-0.0203	0.0052	0.0139	2003	0.0527
2004	0.0187	0.0178	0.0118	-0.0534	-0.0071	0.0093	0.0184	0.0395	0.0101	0.0164	-0.0200	0.0257	2004	0.0872
2005	0.0277	-0.0112	-0.0125	0.0327	0.0295	0.0141	-0.0244	0.0233	-0.0310	-0.0204	0.0099	0.0225	2005	0.0587
2006	-0.0093	0.0128	-0.0404	-0.0224	-0.0020	0.0039	0.0237	0.0361	0.0183	0.0127	0.0246	-0.0232	2006	0.0324
2007	-0.0051	0.0287	-0.0231	0.0140	-0.0178	-0.0148	-0.0032	0.0152	0.0135	0.0088	0.0079	0.0028	2007	0.0260
2008	0.0017	-0.0071	-0.0059	0.0091	-0.0277	-0.0061	-0.0109	0.0121	-0.0863	-0.0450	0.1174	0.1560	2008	0.0878
2009	-0.0949	-0.0308	-0.0018	-0.0030	0.0489	0.0350	0.0565	0.0235	0.0273	0.0016	0.0044	-0.0275	2009	0.0302
2010	0.0096	0.0039	0.0045	0.0357	-0.0051	0.0519	0.0170	0.0473	-0.0144	-0.0203	-0.0057	-0.0036	2010	0.1244
2011	-0.0198	0.0157	-0.0072	0.0239	0.0257	-0.0210	0.0473	0.0240	0.0575	0.0094	-0.0356	0.0512	2011	0.1795
2012	0.0194	0.0057	-0.0303	0.0251	0.0344	0.0064	0.0612	-0.0093	-0.0126	0.0206	-0.0092	-0.0062	2012	0.1068
2013	-0.0313	0.0093	-0.0018	0.0349	-0.0536	-0.0371	0.0031	-0.0074	0.0014	0.0211	-0.0086	0.0002	2013	-0.0707
2014	0.0331	0.0168	0.0062	0.0160	0.0188	0.0020	0.0024	0.0356	-0.0271	0.0225	0.0173	0.0183	2014	0.1728

*Compound annual return

Table A-9

Long-Term Government Bonds: Yields

from January 1926 to December 1970

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Jan–Dec*
1926	0.0374	0.0372	0.0371	0.0368	0.0369	0.0368	0.0370	0.0373	0.0372	0.0367	0.0358	0.0354	1926	0.0354
1927	0.0351	0.0347	0.0331	0.0333	0.0327	0.0334	0.0333	0.0329	0.0330	0.0325	0.0320	0.0317	1927	0.0317
1928	0.0321	0.0318	0.0317	0.0319	0.0327	0.0326	0.0344	0.0341	0.0346	0.0336	0.0338	0.0340	1928	0.0340
1929	0.0349	0.0363	0.0377	0.0358	0.0373	0.0367	0.0369	0.0375	0.0375	0.0347	0.0331	0.0340	1929	0.0340
1930	0.0347	0.0339	0.0335	0.0338	0.0329	0.0328	0.0327	0.0328	0.0324	0.0324	0.0322	0.0330	1930	0.0330
1931	0.0343	0.0338	0.0332	0.0327	0.0317	0.0319	0.0325	0.0326	0.0353	0.0385	0.0385	0.0407	1931	0.0407
1932	0.0390	0.0367	0.0370	0.0336	0.0349	0.0347	0.0320	0.0321	0.0319	0.0322	0.0322	0.0315	1932	0.0315
1933	0.0308	0.0326	0.0321	0.0325	0.0308	0.0306	0.0309	0.0308	0.0308	0.0315	0.0327	0.0336	1933	0.0336
1934	0.0321	0.0317	0.0307	0.0300	0.0292	0.0289	0.0288	0.0299	0.0310	0.0300	0.0299	0.0293	1934	0.0293
1935	0.0281	0.0275	0.0274	0.0269	0.0276	0.0270	0.0268	0.0281	0.0282	0.0279	0.0280	0.0276	1935	0.0276
1936	0.0285	0.0281	0.0275	0.0274	0.0273	0.0273	0.0271	0.0264	0.0268	0.0269	0.0257	0.0255	1936	0.0255
1937	0.0258	0.0253	0.0285	0.0284	0.0282	0.0285	0.0277	0.0286	0.0284	0.0283	0.0278	0.0273	1937	0.0273
1938	0.0271	0.0268	0.0273	0.0259	0.0257	0.0259	0.0257	0.0259	0.0259	0.0254	0.0257	0.0252	1938	0.0252
1939	0.0249	0.0245	0.0237	0.0229	0.0217	0.0221	0.0213	0.0231	0.0278	0.0247	0.0236	0.0226	1939	0.0226
1940	0.0229	0.0228	0.0215	0.0220	0.0246	0.0227	0.0224	0.0223	0.0215	0.0214	0.0199	0.0194	1940	0.0194
1941	0.0213	0.0213	0.0206	0.0196	0.0195	0.0191	0.0191	0.0190	0.0193	0.0182	0.0186	0.0204	1941	0.0204
1942	0.0247	0.0247	0.0244	0.0246	0.0243	0.0244	0.0244	0.0244	0.0244	0.0244	0.0247	0.0246	1942	0.0246
1943	0.0245	0.0246	0.0247	0.0246	0.0244	0.0244	0.0245	0.0245	0.0246	0.0247	0.0248	0.0248	1943	0.0248
1944	0.0248	0.0247	0.0247	0.0248	0.0247	0.0248	0.0247	0.0247	0.0247	0.0247	0.0247	0.0246	1944	0.0246
1945	0.0240	0.0237	0.0236	0.0228	0.0226	0.0217	0.0224	0.0223	0.0221	0.0216	0.0210	0.0199	1945	0.0199
1946	0.0199	0.0198	0.0198	0.0207	0.0209	0.0206	0.0209	0.0217	0.0219	0.0216	0.0220	0.0212	1946	0.0212
1947	0.0214	0.0214	0.0213	0.0217	0.0216	0.0216	0.0214	0.0210	0.0213	0.0217	0.0229	0.0243	1947	0.0243
1948	0.0243	0.0241	0.0241	0.0239	0.0231	0.0238	0.0241	0.0242	0.0242	0.0243	0.0239	0.0237	1948	0.0237
1949	0.0233	0.0231	0.0227	0.0227	0.0227	0.0217	0.0216	0.0210	0.0212	0.0212	0.0212	0.0209	1949	0.0209
1950	0.0215	0.0214	0.0215	0.0214	0.0213	0.0216	0.0214	0.0214	0.0220	0.0225	0.0224	0.0224	1950	0.0224
1951	0.0221	0.0228	0.0241	0.0248	0.0254	0.0259	0.0252	0.0246	0.0253	0.0254	0.0264	0.0269	1951	0.0269
1952	0.0268	0.0269	0.0263	0.0254	0.0257	0.0259	0.0261	0.0267	0.0277	0.0269	0.0272	0.0279	1952	0.0279
1953	0.0279	0.0287	0.0294	0.0303	0.0314	0.0301	0.0301	0.0303	0.0284	0.0281	0.0286	0.0274	1953	0.0274
1954	0.0291	0.0279	0.0278	0.0273	0.0279	0.0272	0.0266	0.0269	0.0271	0.0272	0.0274	0.0272	1954	0.0272
1955	0.0286	0.0292	0.0288	0.0290	0.0287	0.0293	0.0300	0.0301	0.0298	0.0292	0.0295	0.0295	1955	0.0295
1956	0.0292	0.0293	0.0303	0.0311	0.0299	0.0299	0.0313	0.0325	0.0324	0.0329	0.0333	0.0345	1956	0.0345
1957	0.0328	0.0328	0.0331	0.0345	0.0348	0.0361	0.0365	0.0367	0.0364	0.0369	0.0340	0.0323	1957	0.0323
1958	0.0330	0.0326	0.0321	0.0311	0.0313	0.0324	0.0343	0.0371	0.0380	0.0374	0.0368	0.0382	1958	0.0382
1959	0.0408	0.0402	0.0403	0.0414	0.0417	0.0419	0.0417	0.0423	0.0429	0.0421	0.0432	0.0447	1959	0.0447
1960	0.0441	0.0429	0.0411	0.0426	0.0417	0.0407	0.0382	0.0390	0.0387	0.0391	0.0399	0.0380	1960	0.0380
1961	0.0404	0.0392	0.0397	0.0391	0.0397	0.0404	0.0404	0.0410	0.0403	0.0400	0.0404	0.0415	1961	0.0415
1962	0.0419	0.0414	0.0398	0.0394	0.0393	0.0401	0.0412	0.0401	0.0398	0.0395	0.0396	0.0395	1962	0.0395
1963	0.0398	0.0400	0.0401	0.0405	0.0406	0.0407	0.0407	0.0408	0.0410	0.0415	0.0414	0.0417	1963	0.0417
1964	0.0421	0.0424	0.0424	0.0423	0.0422	0.0419	0.0421	0.0423	0.0421	0.0421	0.0422	0.0423	1964	0.0423
1965	0.0422	0.0424	0.0422	0.0422	0.0423	0.0423	0.0424	0.0428	0.0433	0.0433	0.0441	0.0450	1965	0.0450
1966	0.0458	0.0477	0.0460	0.0467	0.0473	0.0477	0.0482	0.0499	0.0480	0.0467	0.0480	0.0455	1966	0.0455
1967	0.0448	0.0465	0.0455	0.0477	0.0482	0.0507	0.0505	0.0514	0.0517	0.0549	0.0567	0.0556	1967	0.0556
1968	0.0536	0.0542	0.0560	0.0547	0.0548	0.0534	0.0517	0.0520	0.0531	0.0543	0.0566	0.0598	1968	0.0598
1969	0.0617	0.0618	0.0620	0.0593	0.0635	0.0623	0.0621	0.0630	0.0677	0.0653	0.0676	0.0687	1969	0.0687
1970	0.0693	0.0651	0.0661	0.0699	0.0743	0.0709	0.0687	0.0694	0.0680	0.0693	0.0637	0.0648	1970	0.0648

from January 1971 to December 2014

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Jan–Dec*
1971	0.0612	0.0629	0.0593	0.0619	0.0624	0.0641	0.0643	0.0610	0.0598	0.0588	0.0596	0.0597	1971	0.0597
1972	0.0606	0.0602	0.0613	0.0615	0.0597	0.0607	0.0593	0.0595	0.0606	0.0591	0.0577	0.0599	1972	0.0599
1973	0.0685	0.0688	0.0686	0.0687	0.0703	0.0710	0.0760	0.0728	0.0703	0.0689	0.0712	0.0726	1973	0.0726
1974	0.0740	0.0748	0.0783	0.0816	0.0810	0.0812	0.0823	0.0855	0.0837	0.0795	0.0771	0.0760	1974	0.0760
1975	0.0796	0.0788	0.0824	0.0852	0.0836	0.0813	0.0829	0.0844	0.0862	0.0819	0.0838	0.0805	1975	0.0805
1976	0.0802	0.0802	0.0792	0.0797	0.0821	0.0807	0.0805	0.0790	0.0781	0.0779	0.0749	0.0721	1976	0.0721
1977	0.0764	0.0775	0.0772	0.0771	0.0765	0.0754	0.0768	0.0754	0.0764	0.0781	0.0777	0.0803	1977	0.0803
1978	0.0816	0.0822	0.0831	0.0838	0.0852	0.0865	0.0858	0.0843	0.0860	0.0889	0.0877	0.0898	1978	0.0898
1979	0.0886	0.0908	0.0902	0.0922	0.0903	0.0877	0.0895	0.0907	0.0927	0.1034	0.1009	0.1012	1979	0.1012
1980	0.1114	0.1186	0.1239	0.1076	0.1037	0.1006	0.1074	0.1140	0.1185	0.1231	0.1230	0.1199	1980	0.1199
1981	0.1211	0.1283	0.1248	0.1332	0.1265	0.1304	0.1370	0.1445	0.1482	0.1384	0.1220	0.1334	1981	0.1334
1982	0.1415	0.1402	0.1387	0.1348	0.1358	0.1412	0.1352	0.1254	0.1183	0.1112	0.1125	0.1095	1982	0.1095
1983	0.1113	0.1060	0.1083	0.1051	0.1112	0.1119	0.1198	0.1210	0.1157	0.1188	0.1176	0.1197	1983	0.1197
1984	0.1180	0.1217	0.1253	0.1284	0.1381	0.1374	0.1293	0.1270	0.1235	0.1173	0.1169	0.1170	1984	0.1170
1985	0.1127	0.1209	0.1181	0.1162	0.1062	0.1055	0.1091	0.1068	0.1082	0.1051	0.1011	0.0956	1985	0.0956
1986	0.0958	0.0841	0.0766	0.0782	0.0848	0.0790	0.0809	0.0763	0.0827	0.0803	0.0779	0.0789	1986	0.0789
1987	0.0778	0.0763	0.0795	0.0859	0.0880	0.0877	0.0907	0.0936	0.0992	0.0926	0.0931	0.0920	1987	0.0920
1988	0.0852	0.0854	0.0901	0.0929	0.0952	0.0917	0.0947	0.0950	0.0917	0.0889	0.0923	0.0919	1988	0.0919
1989	0.0903	0.0935	0.0929	0.0918	0.0878	0.0822	0.0801	0.0841	0.0847	0.0810	0.0808	0.0816	1989	0.0816
1990	0.0865	0.0876	0.0889	0.0924	0.0883	0.0864	0.0860	0.0920	0.0914	0.0898	0.0858	0.0844	1990	0.0844
1991	0.0837	0.0841	0.0844	0.0837	0.0845	0.0860	0.0850	0.0818	0.0790	0.0791	0.0789	0.0730	1991	0.0730
1992	0.0776	0.0777	0.0797	0.0803	0.0781	0.0765	0.0726	0.0725	0.0710	0.0741	0.0748	0.0726	1992	0.0726
1993	0.0725	0.0698	0.0702	0.0701	0.0701	0.0668	0.0656	0.0623	0.0627	0.0623	0.0651	0.0654	1993	0.0654
1994	0.0637	0.0682	0.0725	0.0745	0.0759	0.0774	0.0746	0.0761	0.0800	0.0809	0.0808	0.0799	1994	0.0799
1995	0.0780	0.0758	0.0755	0.0745	0.0677	0.0670	0.0691	0.0674	0.0663	0.0641	0.0623	0.0603	1995	0.0603
1996	0.0609	0.0659	0.0684	0.0706	0.0717	0.0703	0.0707	0.0726	0.0704	0.0671	0.0643	0.0673	1996	0.0673
1997	0.0689	0.0694	0.0723	0.0705	0.0701	0.0688	0.0637	0.0672	0.0649	0.0623	0.0614	0.0602	1997	0.0602
1998	0.0589	0.0599	0.0602	0.0604	0.0592	0.0576	0.0584	0.0547	0.0517	0.0540	0.0535	0.0542	1998	0.0542
1999	0.0536	0.0587	0.0592	0.0594	0.0615	0.0627	0.0639	0.0649	0.0646	0.0651	0.0662	0.0682	1999	0.0682
2000	0.0666	0.0646	0.0618	0.0630	0.0640	0.0622	0.0611	0.0594	0.0612	0.0600	0.0576	0.0558	2000	0.0558
2001	0.0562	0.0549	0.0559	0.0593	0.0594	0.0590	0.0561	0.0546	0.0542	0.0506	0.0553	0.0575	2001	0.0575
2002	0.0569	0.0563	0.0604	0.0575	0.0578	0.0566	0.0544	0.0510	0.0480	0.0508	0.0521	0.0484	2002	0.0484
2003	0.0495	0.0472	0.0486	0.0481	0.0436	0.0452	0.0542	0.0532	0.0490	0.0518	0.0519	0.0511	2003	0.0511
2004	0.0499	0.0483	0.0474	0.0531	0.0539	0.0532	0.0523	0.0493	0.0488	0.0478	0.0502	0.0484	2004	0.0484
2005	0.0465	0.0479	0.0488	0.0461	0.0440	0.0429	0.0456	0.0432	0.0464	0.0484	0.0481	0.0461	2005	0.0461
2006	0.0474	0.0457	0.0507	0.0532	0.0535	0.0531	0.0518	0.0496	0.0484	0.0481	0.0467	0.0491	2006	0.0491
2007	0.0502	0.0477	0.0493	0.0489	0.0510	0.0521	0.0501	0.0487	0.0489	0.0480	0.0445	0.0450	2007	0.0450
2008	0.0436	0.0438	0.0432	0.0458	0.0475	0.0460	0.0465	0.0449	0.0443	0.0478	0.0372	0.0303	2008	0.0303
2009	0.0394	0.0401	0.0355	0.0410	0.0432	0.0429	0.0430	0.0415	0.0403	0.0420	0.0406	0.0458	2009	0.0458
2010	0.0441	0.0441	0.0458	0.0437	0.0407	0.0376	0.0377	0.0327	0.0341	0.0367	0.0380	0.0414	2010	0.0414
2011	0.0432	0.0426	0.0429	0.0416	0.0391	0.0404	0.0366	0.0314	0.0265	0.0288	0.0271	0.0248	2011	0.0248
2012	0.0249	0.0269	0.0290	0.0261	0.0219	0.0225	0.0206	0.0218	0.0226	0.0236	0.0219	0.0241	2012	0.0241
2013	0.0286	0.0279	0.0284	0.0257	0.0298	0.0329	0.0337	0.0348	0.0342	0.0334	0.0354	0.0367	2013	0.0367
2014	0.0335	0.0338	0.0331	0.0324	0.0307	0.0307	0.0301	0.0281	0.0295	0.0273	0.0263	0.0240	2014	0.0240

The Effect of the Firm's Capital Structure on the Systematic Risk of Common Stocks

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THE EFFECT OF THE FIRM'S CAPITAL STRUCTURE ON THE SYSTEMATIC RISK OF COMMON STOCKS

ROBERT S. HAMADA*

I. INTRODUCTION

ONLY RECENTLY has there been an interest in relating the issues historically associated with corporation finance to those historically associated with investment and portfolio analyses. In fact, rigorous theoretical attempts in this direction were made only since the capital asset pricing model of Sharpe [13], Lintner [6], and Mossin [11], itself an extension of the Markowitz [7] portfolio theory. This study is one of the first empirical works consciously attempting to show and test the relationships between the two fields. In addition, differences in the observed systematic or nondiversifiable risk of common stocks, β, have never really been analyzed before by investigating some of the underlying differences in the firms.

In the capital asset pricing model, it was demonstrated that the efficient set of portfolios to any individual investor will always be some combination of lending at the risk-free rate and the "market portfolio," or borrowing at the risk-free rate and the "market portfolio." At the same time, the Modigliani and Miller (MM) propositions [9, 10] on the effect of corporate leverage are well known to the students of corporation finance. In order for their propositions to hold, personal leverage is required to be a perfect substitute for corporate leverage. If this is true, then corporate borrowing could substitute for personal borrowing in the capital asset pricing model as well.

Both in the pricing model and the MM theory, borrowing, from whatever source, while maintaining a fixed amount of equity, increases the risk to the investor. Therefore, in the mean-standard deviation version of the capital asset pricing model, the covariance of the asset's rate of return with the market portfolio's rate of return (which measures the nondiversifiable risk of the asset—the proxy β will be used to measure this) should be greater for the stock of a firm with a higher debt-equity ratio than for the stock of another firm in the same risk-class with a lower debt-equity ratio.[1]

This study, then, has a number of purposes. First, we shall attempt to link empirically corporation finance issues with portfolio and security analyses through the effect of a firm's leverage on the systematic risk of its common

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1. This very quick summary of the theoretical relationship between what is known as corporation finance and the modern investment and portfolio analyses centered around the capital asset pricing model is more thoroughly presented in [5], along with the necessary assumptions required for this relationship.

stock. Then, we shall attempt to test the MM theory, or at least provide another piece of evidence on this long-standing controversial issue. This test will not rely on an explicit valuation model, such as the MM study of the electric utility industry [8] and the Brown study of the railroad industry [2]. A procedure using systematic risk measures (β s) has been worked out in this paper for this purpose.

If the MM theory is validated by this procedure, then the final purpose of this study is to demonstrate a method for estimating the cost of capital of individual firms to be used by them for scale-changing or nondiversifying investment projects. The primary component of any firm's cost of capital is the capitalization rate for the firm if the firm had no debt and preferred stock in its capital structure. Since most firms do have fixed commitment obligations, this capitalization rate (we shall call it $E(R_A)$; MM denote it ρ^τ) is unobservable. But if the MM theory and the capital asset pricing model are correct, then it is possible to estimate $E(R_A)$ from the systematic risk approach for individual firms, even if these firms are members of a one-firm risk-class.[2]

With this statement of the purposes for this study, we shall, in Section II, discuss the alternative general procedures that are possible for estimating the effect of leverage on systematic risk and select the most feasible ones. The results are presented in Section III. And finally, tests of the MM versus the traditional theories of corporation finance are presented in Section IV.

II. Some Possible Procedures and the Selected Estimating Relationships

There are at least four general procedures that can be used to estimate the effect of the firm's capital structure on the systematic risk of common stocks. The first is the MM valuation model approach. By estimating ρ^τ with an explicit valuation model as they have for the electric utility industry, it is possible to relate this ρ^τ with the use of the capital asset pricing model to a nonleveraged systematic risk measure, ${}_A\beta$. Then the difference between the observed common stock's systematic risk (which we shall denote ${}_B\beta$) and ${}_A\beta$ would be due solely to leverage. But the difficulties of this approach for all firms are many.

The MM valuation model approach requires the specification, in advance, of risk-classes. All firms in a risk-class are then assumed to have the same ρ^τ—the capitalization rate for an all-common equity firm. Unfortunately, there must be enough firms in a risk-class so that a cross-section analysis will yield statistically significant coefficients. There may not be many more risk-classes (with enough observations) now that the electric utility and railroad industries have been studied. In addition, the MM approach requires estimating expected asset earnings and estimating the capitalized growth potential implicit in stock prices. If it is possible to consider growth and expected earnings without having

2. It is, in fact, this last purpose of making applicable and practical some of the implications of the capital asset pricing model for corporation finance issues that provided the initial motivation for this paper. In this context, if one is familiar with the fair rate of return literature for regulated utilities, for example, an industry where debt is so prevalent, adjusting correctly for leverage is not frequently done and can be very critical.

to specify their exact magnitude at a specific point in time, considerable difficulty and possible measurement errors will be avoided.

The second approach is to run a regression between the observed systematic risk of a stock and a number of accounting and leverage variables in an attempt to explain this observed systematic risk. Unfortunately, without a theory, we do not know which variables to include and which variables to exclude and whether the relationship is linear, multiplicative, exponential, curvilinear, etc. Therefore, this method will also not be used.

A third approach is to measure the systematic risk before and after a new debt issue. The difference can then be attributed to the debt issue directly. An attractive feature of this procedure is that a good estimate of the market value of the incremental debt issue can be obtained. A number of disadvantages, unfortunately, are associated with this direct approach. The difference in the systematic risk may be due not only to the additional debt, but also to the reason the debt was issued. It may be used to finance a new investment project, in which case the project's characteristics will also be reflected in the new systematic risk measure. In addition, the new debt issue may have been anticipated by the market if the firm had some long-run target leverage ratio which this issue will help maintain; conversely, the market may not fully consider the new debt issue if it believes the increase in leverage is only temporary. For these reasons, this seemingly attractive procedure will not be employed.

The last approach, which will be used in this study, is to assume the validity of the MM theory from the outset. Then the observed rate of return of a stock can be adjusted to what *it would have been* over the same time period had the firm no debt and preferred stock in its capital structure. The difference between the observed systematic risk, ${}_B\beta$, and the systematic risk for this adjusted rate of return time series, ${}_A\beta$, can be attributed to leverage, if the MM theory is correct. The final step, then, is to test the MM theory.

To discuss this more specifically, consider the following relationship for the dollar return to the common shareholder from period $t - 1$ to t:

$$(X - I)_t(1 - \tau)_t - p_t + \Delta G_t = d_t + cg_t \tag{1}$$

where X_t represents earnings before taxes, interest, and preferred dividends and is assumed to be unaffected by fixed commitment obligations; I_t represents interest and other fixed charges paid during the period; τ is the corporation income tax rate; p_t is the preferred dividends paid; ΔG_t represents the change in capitalized growth over the period; and d_t and cg_t are common shareholder dividends and capital gains during the period, respectively.

Equation (1) relates the corporation finance types of variables with the market holding period return important to the investors. The first term on the left-hand-side of (1) is profits after taxes and after interest which is the earnings the common and preferred shareholders receive on their investment for the period. Subtracting out p_t leaves us with the earnings the common shareholder would receive from currently-held assets.

To this must be added any change in capitalized growth since we are trying to explain the common shareholder's market holding period dollar return. ΔG_t

must be added for growth firms to the current period's profits from existing assets since capitalized growth opportunities of the firm—future earnings from new assets over and above the firm's cost of capital which are already reflected in the stock price at $(t-1)$—should change over the period and would accrue to the common shareholder. Assuming shareholders at the start of the period estimated these growth opportunities on average correctly, the expected value of ΔG_t would not be zero, but should be positive. For example, consider growth opportunities five years from now which yield more than the going rate of return and are reflected in today's stock price. These growth opportunities will become one year closer to fruition at time t than at time $t-1$ so that their present value would become larger. ΔG_t then represents this increase in the present value of these future opportunities simply because it is now four years away rather than five.[3]

Since the systematic risk of a common stock is:

$$_B\beta = \frac{\text{cov}\,(R_{B_t}, R_{M_t})}{\sigma^2(R_{M_t})} \tag{2}$$

where R_{B_t} is the common shareholder's rate of return and R_{M_t} is the rate of return on the market portfolio, then substitution of (1) into (2) yields:

$$_B\beta = \frac{\text{cov}\left[\dfrac{(X-I)(1-\tau)_t - p_t + \Delta G_t}{S_{B_{t-1}}}, R_{M_t}\right]}{\sigma^2(R_{M_t})} \tag{2a}$$

where $S_{B_{t-1}}$ denotes the market value of the common stock at the beginning of the period.

The systematic risk for the same firm over the same period *if* there were no debt and preferred stock in its capital structure is:

$$_A\beta = \frac{\text{cov}(R_{A_t}, R_{M_t})}{\sigma^2(R_{M_t})}$$

$$= \frac{\text{cov}\left[\dfrac{X(1-\tau)_t + \Delta G_t}{S_{A_{t-1}}}, R_{M_t}\right]}{\sigma^2(R_{M_t})} \tag{3}$$

where R_{A_t} and $S_{A_{t-1}}$ represent the rate of return and the market value, respectively, to the common shareholder if the firm had no debt and preferred stock. From (3), we can obtain:

$$_A\beta S_{A_{t-1}} = \frac{\text{cov}\,[X(1-\tau)_t + \Delta G_t, R_{M_t}]}{\sigma^2(R_{M_t})} \tag{3a}$$

3. Continual awareness of the difficulties of estimating capitalized growth, or changes in growth, especially in conjunction with leverage considerations, for purposes such as valuation or cost of capital is a characteristic common to students of corporation finance. This is the reason for the emphasis on growth in this paper and for presenting a method to neutralize for differences in growth when comparing rates of return.

Next, by expanding and rearranging (2a), we have:

$$_B\beta S_{B_{t-1}} = \frac{\text{cov}\,[X(1-\tau)_t + \Delta G_t, R_{M_t}]}{\sigma^2(R_{M_t})} - \frac{\text{cov}\,[I(1-\tau)_t, R_{M_t}]}{\sigma^2(R_{M_t})} - \frac{\text{cov}\,(p_t, R_{M_t})}{\sigma^2(R_{M_t})} \tag{2b}$$

If we assume as an empirical approximation that interest and preferred dividends have negligible covariance with the market, at least relative to the (pure equity) common stock's covariance, then substitution of the LHS of (3a) into the RHS of (2b) yields:[4]

$$_B\beta S_{B_{t-1}} = {_A\beta} S_{A_{t-1}} \tag{4}$$

or

$$_A\beta = \left(\frac{S_B}{S_A}\right)_{t-1} {_B\beta} \tag{4a}$$

Because $S_{A_{t-1}}$, the market value of common stock *if* the firm had no debt and preferred stock, is not observable since most firms do have debt and/or preferred stock, a theory is required in order to measure what this quantity *would have been* at $t-1$. The MM theory [10] will be employed for this purpose, that is:

$$S_{A_{t-1}} = (V - \tau D)_{t-1}. \tag{5}$$

Equation (5) indicates that if the Federal government tax subsidy for debt financing, τD, where D is the market value of debt, is subtracted from the observed market value of the firm, V_{t-1} (where V_{t-1} is the sum of S_B, D and the observed market value of preferred), then the market value of an unleveraged firm is obtained. Underlying (5) is the assumption that the firm is near its target leverage ratio so that no more or no less debt subsidy is capitalized already into the observed stock price. The conditions under which this MM relationship hold are discussed carefully in [4].

It is at this point that problems in obtaining satisfactory estimates of $_A\beta$ develop, since (4) theoretically holds only for the next period. As a practical matter, the accepted, and seemingly acceptable, method of obtaining estimates of a stock's systematic risk, $_B\beta$, is to run a least squares regression between a stock's and market portfolio's *historical* rates of return. Using past data for $_B\beta$, it is not clear which *period's* ratio of market values to apply in (4a) to estimate the firm's systematic risk, $_A\beta$. There would be no problem if the market value ratios of debt to equity and preferred stock to equity remained relatively stable over the past for each firm, but a cursory look at these data reveals that this is not true for the large majority of firms in our sample. Should we use the market value ratio required in (4a) that was observed at the start of our regression period, at the end of our regression period, or some kind of average over the period? In addition, since these different observed ratios will give us different estimates for $_A\beta$, it is not clear, without some criterion, how we should select from among the various estimates.

4. This general method of arriving at (4) was suggested by the comments of William Sharpe, one of the discussants of this paper at the annual meeting. A much more cumbersome and less general derivation of (4) was in the earlier version.

It is for this purpose—to obtain a standard—that a more cumbersome and more data demanding approach to obtain estimates of ${}_A\beta$ is suggested. Given the large fluctuations in market leverage ratios, intuitively it would appear that the firm's risk is more stable than the common stock's risk. In that event, a leverage-free rate of return time series for each firm should be derived and the market model applied to this time series directly. In this manner, the beta coefficient would give us a *direct* estimate of ${}_A\beta$ which can then be used as a criterion to determine if any of the market value ratios discussed above can be applied to (4a) successfully.

For this purpose, the "would-have-been" rate of return for the common stock if the firm had no debt and preferred is:

$$R_{A_t} = \frac{X_t(1-\tau)_t + \Delta G_t}{S_{A_{t-1}}}. \tag{6}$$

The numerator of (6) can be rearranged to be:

$$X_t(1-\tau)_t + \Delta G_t \equiv [(X-I)_t(1-\tau)_t - p_t + \Delta G_t] + p_t + I_t(1-\tau)_t.$$

Substituting (1):

$$X_t(1-\tau)_t + \Delta G_t = [d_t + cg_t] + p_t + I_t(1-\tau)_t.$$

Therefore, (6) can be written as:

$$R_{A_t} = \frac{d_t + cg_t + p_t + I_t(1-\tau)_t}{S_{A_{t-1}}}. \tag{7}$$

Since $S_{A_{t-1}}$ is unobservable for the firms with leverage, the MM theory, equation (5), will be employed; then:

$$R_{A_t} = \frac{d_t + cg_t + p_t + I_t(1-\tau)_t}{(V-\tau D)_{t-1}}. \tag{8}$$

The observed rate of return on the common stock is, of course:

$$R_{B_t} = \frac{(X-I)_t(1-\tau)_t - p_t + \Delta G_t}{S_{B_{t-1}}} = \frac{d_t + cg_t}{S_{B_{t-1}}}. \tag{9}$$

Equation (8) is the rate of return to the common shareholder of the same firm and over the same period of time as (9). However, in (8) there are the underlying assumptions that the firm never had any debt and preferred stock and that the MM theory is correct; (9) incorporates the exact amount of debt and preferred stock that the firm actually did have over this time period and no leverage assumption is being made. Both (8) and (9) are now in forms where they can be measured with available data. One can note that it is unnecessary to estimate the change in growth, or earnings from current assets, since these should be captured in the market holding period return, $d_t + cg_t$.

Using CRSP data for (9) and both CRSP and Compustat data for the components of (8), a time series of yearly R_{A_t} and R_{B_t} for $t = 1948\text{-}1967$ were derived for 304 different firms. These 304 firms represent an exhaustive sample of the firms with complete data on both tapes for all the years.

A number of "market model" [1, 12] variants were then applied to these data. For each of the 304 firms, the following regressions were run:

$$R_{Ait} = {}_A\alpha_i + {}_A\beta_i R_{Mt} + {}_A\epsilon_{it} \quad (10a)$$

$$R_{Bit} = {}_B\alpha_i + {}_B\beta_i R_{Mt} + {}_B\epsilon_{it} \quad (10b)$$

$$\ln(1 + R_{Ait}) = {}_{AC}\alpha_i + {}_{AC}\beta_i \ln(1 + R_{M_t}) + {}_{AC}\epsilon_{it} \quad (10c)$$

$$\ln(1 + R_{Bit}) = {}_{BC}\alpha_i + {}_{BC}\beta_i \ln(1 + R_{M_t}) + {}_{BC}\epsilon_{it} \quad (10d)$$

$$i = 1, 2, \ldots, 304$$
$$t = 1948\text{-}1967$$

where R_{M_t} is the observed NYSE arithmetic stock market rate of return with dividends reinvested, α_i and β_i are constants for each firm-regression, and the usual conditions are assumed for the properties of the disturbance terms, ϵ_{it}. Equations (10c) and (10d) are the continuously-compounded rate of return versions of (10a) and (10b), respectively.[5]

III. The Results

An abbreviated table of the regression results for each of the four variants, equations (10a)-(10d), summarized across the 304 firms is shown in Table 1.

The first column designated "mean" is the average of the statistic (indicated by the rows) over all 304 firms. Therefore, the mean ${}_A\hat{\alpha}$ of 0.0221 is the intercept term of equation (10a) averaged over 304 different firm-regressions. The second and third columns give the deviation measures indicated, of the 304 point estimates of, say, ${}_A\hat{\alpha}$. The mean standard error of estimate in the last column is the average over 304 firms of the individual standard errors of estimate.

The major conclusion drawn from Table 1 is the following mean β comparisons:

$${}_B\hat{\beta} > {}_A\hat{\beta}, \text{ i.e., } 0.9190 > 0.7030$$
$${}_{BC}\hat{\beta} > {}_{AC}\hat{\beta}, \text{ i.e., } 0.9183 > 0.7263.$$

The directional results of these betas, assuming the validity of the MM theory, are not imperceptible and clearly are not negligible differences from the investor's point of view. This is obtained in spite of all the measurement and data problems associated with estimating a time series of the RHS of (8) for

5. Because the R_{M_t} used in equations (10) is defined as the observed stock market return, and since adjusting for capital structure is the major purpose of this exercise, it was decided that the same four regressions should be replicated on a leverage-adjusted stock market rate of return. The major reason for this additional adjustment is the belief that the rates of return over time and their relationship with the market are more stable when we can abstract from all changes in leverage and get at the underlying risk of all firms.

For the 221 firms (out of the total 304) whose fiscal years coincide with the calendar year, average values for the components of the RHS of (8) were obtained for each year so that R_{M_t} could be adjusted in the same way as for the individual firms—a yearly time series of stock market rates of return, if all the firms on the NYSE had no debt and no preferred in their capital structure, was derived. The results, when using this adjusted market portfolio rate of return time series, were not very different from the results of equations (10), and so will not be reported here separately.

TABLE 1
SUMMARY RESULTS OVER 304 FIRMS OF EQUATIONS (10a)-(10d)

	Mean	Mean Absolute Deviation*	Standard Deviation	Mean Standard Error of Estimate
${}_{A}\hat{\alpha}$	0.0221	0.0431	0.0537	0.0558
${}_{A}\hat{\beta}$	0.7030	0.2660	0.3485	0.2130
${}_{A}\hat{R}^2$	0.3799	0.1577	0.1896	
${}_{A}\hat{\rho}$	0.0314			
${}_{B}\hat{\alpha}$	0.0187	0.0571	0.0714	0.0720
${}_{B}\hat{\beta}$	0.9190	0.3550	0.4478	0.2746
${}_{B}\hat{R}^2$	0.3864	0.1578	0.1905	
${}_{B}\hat{\rho}$	0.0281			
${}_{AC}\hat{\alpha}$	0.0058	0.0427	0.0535	0.0461
${}_{AC}\hat{\beta}$	0.7263	0.2700	0.3442	0.2081
${}_{AC}\hat{R}^2$	0.3933	0.1586	0.1909	
${}_{AC}\hat{\rho}$	0.0268			
${}_{BC}\hat{\alpha}$	−0.0052	0.0580	0.0729	0.0574
${}_{BC}\hat{\beta}$	0.9183	0.3426	0.4216	0.2591
${}_{BC}\hat{R}^2$	0.4012	0.1602	0.1922	
${}_{BC}\hat{\rho}$	0.0262			

* Defined as: $\dfrac{\sum_{i=1}^{N} |x_i - \bar{x}|}{N}$, where $N = 304$. $\hat{\rho}$ = first order serial correlation coefficient.

each firm. One of the reasons for the "traditional" theory position on leverage is precisely this point—that small and reasonable amounts of leverage cannot be discerned by the market. In fact, if the MM theory is correct, leverage has explained as much as, roughly, 21 to 24 per cent of the value of the mean β.

We can also note that if the covariance between the asset and market rates of return, as well as the market variance, was constant over time, then the systematic risk from the market model is related to the expected rate of return by the capital asset pricing model. That is:

$$E(R_{A_t}) = R_{F_t} + {}_{A}\beta[E(R_{M_t}) - R_{F_t}] \tag{11a}$$

$$E(R_{B_t}) = R_{F_t} + {}_{B}\beta[E(R_{M_t}) - R_{F_t}] \tag{11b}$$

Equation (11a) indicates the relationship between the expected rate of return for the common stock shareholder of a debt-free and preferred-free firm, to the systematic risk, ${}_{A}\beta$, as obtained in regressions (10a) or (10c). The LHS of (11a) is the important $\rho\tau$ for the MM cost of capital. The MM theory [9, 10] also predicts that shareholder expected yield must be higher (for the same real firm) when the firm has debt than when it does not. Financial risk is greater, therefore, shareholders require more expected return. Thus, $E(R_{B_t})$ must be greater than $E(R_{A_t})$. In order for this MM prediction to be true, from (11a) and (11b) it can be observed that ${}_{B}\beta$ must be greater than ${}_{A}\beta$, which is what we obtained.

Using the results underlying Table 1, namely the firm and stock betas, as the criterion for selecting among the possible observed market value ratios that can be used, if any, for (4), the following cross-section regressions were run:

$$({}_{B}\beta)_i = a_1 + b_1 \left(\frac{S_A}{S_B}\, {}_{A}\beta \right)_i + u_{1i} \qquad i = 1, 2, \ldots, 102 \qquad (12a)$$

$$({}_{BC}\beta)_i = a_2 + b_2 \left(\frac{S_A}{S_B}\, {}_{AC}\beta \right)_i + u_{2i} \qquad i = 1, 2, \ldots, 102 \qquad (12b)$$

$$({}_{A}\beta)_i = a_3 + b_3 \left(\frac{S_B}{S_A}\, {}_{B}\beta \right)_i + u_{3i} \qquad i = 1, 2, \ldots, 102 \qquad (13a)$$

$$({}_{AC}\beta)_i = a_4 + b_4 \left(\frac{S_B}{S_A}\, {}_{BC}\beta \right)_i + u_{4i} \qquad i = 1, 2, \ldots, 102 \qquad (13b)$$

Because the preferred stock market values were not as reliable as debt, only the 102 firms (out of 304) that did not have preferred in any of the years were used. The test for the adequacy of this alternative approach, equation (4), to adjust the systematic risk of common stocks for the underlying firm's capital structure, is whether the intercept term, a, is equal to zero, and the slope coefficient, b, is equal to one in the above regressions (as well as, of course, a high R^2)—these requirements are implied by (4). The results of this test would also indicate whether future "market model" studies that only use common stock rates of return without adjusting, or even noting, for the firm's debt-equity ratio will be adequate. The total firm's systematic risk may be stable (as long as the firm stays in the same risk-class), whereas the common stock's systematic risk may not be stable merely because of unanticipated capital structure changes—the data underlying Table 3 indicate that there were very few firms which did not have major changes in their capital structure over the twenty years studied.

The results of these regressions, when using the average S_A and average S_B over the twenty years for each firm, are shown in the first column panel of Table 2. These regressions were then replicated twice, first using the December 31, 1947 values of S_{A_i} and S_{B_i} instead of the twenty-year average for each firm, and then substituting the December 31, 1966 values of S_{A_i} and S_{B_i} for the 1947 values. These results are in the second and third panels of Table 2.[6]

From the first panel of Table 2, it appears that this alternative approach via (4a) for adjusting the systematic risk for the firm's leverage is quite

6. The point should be made that we are not merely regressing a variable on itself in (12) and (13). (12a) and (12b) can be interpreted as correlating the ${}_{B}\beta_i$ obtained from (10b) and (10d)—the LHS variable in (12a) and (12b)—against the ${}_{B}\beta_i$ obtained from rearranging (4)—the RHS variable in (12a) and (12b)—to determine whether the use of (4) is as good a means of obtaining ${}_{B}\beta_i$ as the direct way via the equations (10). We would be regressing a variable on itself only if the ${}_{A}\beta_i$ were calculated using (4a), and then the ${}_{A}\beta_i$ thus obtained, inserted into (12a) and (12b).

Instead, we are obtaining ${}_{A}\beta_i$ using the MM model in *each* of the twenty years so that a leverage-adjusted 20 year time series of R_{A_i} is derived. Of course, if there were no data nor measurement problems, and if the debt-to-equity ratio were perfectly stable over this twenty year period for each firm, then we should obtain perfect correlation in (12a) and (12b), with a = 0 and b = 1, as (4) would be an identity.

TABLE 2

Results for the Equations (12a), (12b), (13a), and (13b)*

	Using 20-Year Average for $\left(\frac{S_A}{S_B}\right)_i$			Using 1947 Value for $\left(\frac{S_A}{S_B}\right)_i$			Using 1966 Value for $\left(\frac{S_A}{S_B}\right)_i$		
	a	b	R^2	a	b	R^2	a	b	R^2
Eq. (12a)	−0.022 (0.021)	1.062 (0.021)	0.962	0.150 (0.048)	0.842 (0.045)	0.781	0.085 (0.041)	0.905 (0.038)	0.849
	constant suppressed	1.042 (0.009)	0.962	constant suppressed	0.966 (0.021)	0.781	constant suppressed	0.976 (0.017)	0.849
Eq. (12b)	−0.003 (0.013)	1.016 (0.013)	0.984	0.159 (0.047)	0.816 (0.044)	0.773	0.124 (0.037)	0.843 (0.034)	0.859
	constant suppressed	1.014 (0.005)	0.984	constant suppressed	0.952 (0.019)	0.773	constant suppressed	0.947 (0.015)	0.859

	Using 20-Year Average for $\left(\frac{S_B}{S_A}\right)_i$			Using 1947 Value for $\left(\frac{S_B}{S_A}\right)_i$			Using 1966 Value for $\left(\frac{S_B}{S_A}\right)_i$		
	a	b	R^2	a	b	R^2	a	b	R^2
Eq. (13a)	0.030 (0.016)	0.931 (0.017)	0.969	0.112 (0.028)	0.843 (0.030)	0.888	0.080 (0.027)	0.898 (0.030)	0.902
	constant suppressed	0.960 (0.007)	0.969	constant suppressed	0.948 (0.015)	0.888	constant suppressed	0.976 (0.014)	0.902
Eq. (13b)	0.007 (0.010)	0.979 (0.011)	0.988	0.119 (0.026)	0.852 (0.028)	0.902	0.063 (0.026)	0.942 (0.029)	0.911
	constant suppressed	1.004 (0.012)	0.911	constant suppressed	0.967 (0.013)	0.902	constant suppressed	1.005 (0.012)	0.911

* Standard error in parentheses.

KY PSC Case No. 2016-00162, Attachment F to AG 1-25
Page 11 of 19

satisfactory (at least with respect to our sample of firms and years) only if long-run averages of S_A and S_B are used. The second and third panels indicate that the equations (8) and (10) procedure is markedly superior when only one year's market value ratio is used as the adjustment factor. The annual debt-to-equity ratio is much too unstable for this latter procedure.

Thus, when forecasting systematic risk is the primary objective—for example, for portfolio decisions or for estimating the firm's cost of capital to apply to prospective projects—a long-run forecasted leverage adjustment is required. Assuming the firm's risk is more stable than the common stock's risk,[7] and if there is some reason to believe that a better forecast of the firm's future leverage can be obtained than using simply a past year's (or an average of past years') leverage, it should be possible to improve the usual extrapolation forecast of a stock's systematic risk by forecasting the total firm's systematic risk first, and then using the independent leverage estimate as an adjustment.

IV. Tests of the MM vs. Traditional Theories of Corporation Finance

To determine if the difference, ${}_B\beta - {}_A\beta$, found in this study is indeed the correct effect of leverage, some confirmation of the MM theory (since it was assumed to be correct up to this point) from the systematic risk approach is needed. Since a direct test by this approach seems impossible, an indirect, inferential test is suggested.

The MM theory [9, 10] predicts that for firms in the same risk-class, the capitalization rate if all the firms were financed with only common equity, $E(R_A)$, would be the same—regardless of the actual amount of debt and preferred each individual firm had. This would imply, from (11a), that if $E(R_A)$ must be the same for all firms in a risk-class, so must ${}_A\beta$. And if these firms had different ratios of fixed commitment obligations to common equity, this difference in financial risk would cause their observed ${}_B\beta$s to be different.

The major competing theory of corporation finance is what is now known as the "traditional theory," which has contrary implications. This theory predicts that the capitalization rate for common equity, $E(R_B)$, (sometimes called the required or expected stock yield, or expected earnings-price ratio) is constant, as debt is increased, up to some critical leverage point (this point being a function of gambler's ruin and bankruptcy costs).[8] The clear implication of this constant, horizontal, equity yield (or their initial downward sloping cost of capital curve) is that changes in market or covariability risk are assumed not to be discernible to the shareholders as debt is increased. Then the traditional theory is saying that the ${}_B\beta$s, a measure of this covariability risk, would be the same for all firms in a given risk-class irregardless of differences in leverage, as long as the critical leverage point is not reached.

Since there will always be unavoidable errors in estimating the β's of indi-

7. A faint, but possible, empirical indication of this point may be obtained from Table 1. The ratio of the mean point estimate to the mean standard error of estimate is less for the firm β than for the stock β in both the discrete and continuously compounded cases.

8. This interpretation of the traditional theory can be found in [9, especially their figure 2, page 275, and their equation (13) and footnote 24 where reference is made to Durand and Graham and Dodd].

TABLE 3
INDUSTRY MARKET VALUE RATIOS OF PREFERRED STOCK (P) AND DEBT (D) TO COMMON STOCK (S)

Industry Number	Industry	Number of Firms		P/S		D/S		$\frac{P+D}{S}$	
20	Food and Kindred Products	30	Mean*	0.22		0.81		1.04	
			ROM**	0.00	1.18	0.00	3.55	0.00	4.13
			ROCR***	0.00	2.52	0.00	8.10	0.00	10.01
28	Chemicals and Allied Products	30	Mean	0.07		0.25		0.33	
			ROM	0.00	0.51	0.00	0.90	0.00	1.20
			ROCR	0.00	1.54	0.00	2.07	0.00	2.92
29	Petroleum and Coal Products	18	Mean	0.06		0.22		0.27	
			ROM	0.00	0.26	0.00	0.55	0.03	0.57
			ROCR	0.00	0.83	0.00	1.54	0.00	2.30
33	Primary Metals	21	Mean	0.14		0.54		0.68	
			ROM	0.00	1.31	0.00	1.95	0.00	3.04
			ROCR	0.00	4.69	0.00	6.20	0.00	7.49
35	Machinery, except Electrical	28	Mean	0.07		0.33		0.40	
			ROM	0.00	0.49	0.00	1.92	0.00	2.32
			ROCR	0.00	1.28	0.00	6.92	0.00	7.62

KY PSC Case No. 2016-00162, Attachment F to AG 1-25
Page 13 of 19

TABLE 3 (*Continued*)

Industry Number	Industry	Number of Firms		P/S		D/S		$\frac{P+D}{S}$	
36	Electrical Machinery & Equipment	13	Mean	0.06		0.35		0.41	
			ROM	0.00	0.29	0.00	1.31	0.01	1.33
			ROCR	0.00	1.13	0.00	2.53	0.00	2.53
37	Transportation Equipment	24	Mean	0.08		0.38		0.47	
			ROM	0.00	0.54	0.00	0.93	0.00	1.32
			ROCR	0.00	2.33	0.00	3.76	0.00	6.09
49	Utilities	27	Mean	0.25		1.03		1.28	
			ROM	0.00	0.53	0.49	2.64	0.52	3.12
			ROCR	0.00	3.12	0.12	16.40	0.12	19.52
53	Dep't Stores, Order Houses & Vending Mach. Operators	17	Mean	0.13		0.49		0.62	
			ROM	0.00	0.38	0.01	1.52	0.01	1.87
			ROCR	0.00	1.09	0.00	3.19	0.00	3.66

* "Mean" refers to the average ratio over 20 years and over all firms in the industry.
** "Range of Means" (ROM) refers to the lowest firm's mean (over 20 years) ratio and the highest firm's mean (over 20 years) ratio in the industry.
*** "Range of Company Ranges" (ROCR) refers to the lowest and highest ratio in the industry, regardless of the year.

KY PSC Case No. 2016-00162, Attachment F to AG 1-25
Page 14 of 19

vidual firms and in specifying a risk-class, we would not expect to find a set of firms with identical systematic risk. But by specifying reasonable a priori risk-classes, if the individual firms had closer or less scattered ${}_A\beta$s than ${}_B\beta$s, then this would support the MM theory and contradict the traditional theory. If, instead, the ${}_B\beta$s were not discernibly more diverse than the ${}_A\beta$s, and the leverage ratio differed considerably among firms, then this would indicate support for the traditional theory.[9]

In order to test this implication, risk-classes must be first specified. The SEC two-digit industry classification was used for this purpose. Requiring enough firms for statistical reasons in any given industry, nine risk-classes were specified that had at least 13 firms; these nine classes are listed in Table 3 with their various leverage ratios.[10] It is clear from this table that our first requirement is met—that there is a considerable range of leverage ratios among firms in a risk-class and also over the twenty-year period.

Three tests will be performed to distinguish between the MM and traditional theories. The first is simply to calculate the standard deviation of the unbiased β estimates in a risk-class. The second is a chi-square test of the distribution of β's in an industry compared to the distribution of the β's in the total sample. Finally, an analysis of variance test on the estimated variance of the β's between industries, as opposed to within industries, is performed. In all tests, only the point estimate of β (which should be unbiased) for each stock and firm is used.[11]

The first test is reported in Table 4. If we compare the standard deviation of ${}_{AC}\beta$ with the standard deviation of ${}_{BC}\beta$ by industries (or risk-classes), we can note that $\sigma({}_{AC}\beta)$ is less than $\sigma({}_{BC}\beta)$ for eight out of the nine classes. The probability of obtaining this is only 0.0195, given a 50% probability that $\sigma({}_{AC}\beta)$ can be larger or smaller than $\sigma({}_{BC}\beta)$. These results indicate that the systematic risk of the firms in a given risk-class, if they were all financed only with common equity, is much less diverse than their observed stock's systematic risk. This supports the MM theory, at least in contrast to the traditional theory.[12]

9. The traditional theory also implies that $E(R_A)$ is equal to $E(R_B)$ for all firms. Unfortunately, we do not have a functional relationship between these traditional theory capitalization rates and the measured βs of this study. Clearly, since the ${}_A\beta$s were obtained assuming the validity of the MM theory, they would not be applicable for the traditional theory. In fact, no relationship between the ${}_A\beta$ and ${}_B\beta$ for a given firm, or for firms in a given risk-class, can be specified as was done for the capitalization rates.

10. The tenth largest industry had only eight firms. For our purpose of testing the uniformity of firm βs relative to stock βs within a risk-class, the use of the two-digit industry classification as a proxy does not seem as critical as, for instance, its use for the purpose of performing an MM valuation model study [8] wherein the ρ^τ must be pre-specified to be exactly the same for all firms in the industry.

11. Since these βs are estimated in the market model regressions with error, precise testing should incorporate the errors in the β estimation. Unfortunately, to do this is extremely difficult and more importantly, requires the normality assumption for the market model disturbance term. Since there is considerable evidence that is contrary to this required assumption [see 3], our tests will ignore the β measurement error entirely. But ignoring this is partially corrected in our first and third tests since means and variances of these point estimate βs must be calculated, and this procedure will "average out" the individual measurement errors by the factor 1/N.

12. Of course, there could always be another theory, as yet not formulated, which could be even

TABLE 4
MEAN AND STANDARD DEVIATION OF INDUSTRY β'S

Industry Number	Industry	Number of Firms		$_A\beta$	$_B\beta$	$_{AC}\beta$	$_{BC}\beta$
20	Food & Kindred Products	30	Mean β	0.515	0.815	0.528	0.806
			σ(β)	0.232	0.448	0.227	0.424
28	Chemicals & Allied Products	30	Mean β	0.747	0.928	0.785	0.946
			σ(β)	0.237	0.391	0.216	0.329
29	Petroleum & Coal Products	18	Mean β	0.633	0.747	0.656	0.756
			σ(β)	0.144	0.188	0.148	0.176
33	Primary Metals	21	Mean β	1.036	1.399	1.106	1.436
			σ(β)	0.223	0.272	0.197	0.268
35	Machinery, except Electrical	28	Mean β	0.878	1.037	0.917	1.068
			σ(β)	0.262	0.240	0.271	0.259
36	Electrical Machinery and Equipment	13	Mean β	0.940	1.234	0.951	1.164
			σ(β)	0.320	0.505	0.283	0.363
37	Transportation Equipment	24	Mean β	0.860	1.062	0.875	1.048
			σ(β)	0.225	0.313	0.225	0.289
49	Utilities	27	Mean β	0.160	0.255	0.166	0.254
			σ(β)	0.086	0.133	0.098	0.147
53	Department Stores, etc.	17	Mean β	0.652	0.901	0.692	0.923
			σ(β)	0.187	0.282	0.198	0.279

Our second test, the chi-square test, requires us to rank our 300 $_A\beta$s into ten equal categories, each with 30 $_A\beta$s (four miscellaneous firms were taken out randomly). By noting the value of the highest and lowest $_A\beta$ for each of the ten categories, a distribution of the number of $_A\beta$s in each category, by risk-class, can be obtained. This was then repeated for the other three betas. To test whether the distribution for each of the four β's and for each of the risk-classes follows the expected uniform distribution, a chi-square test was performed.[13]

Even with just casual inspection of these distributions of the betas by risk-class, it is clear that two industries, primary metals and utilities, are so highly skewed that they greatly exaggerate our results.[14] Eliminating these

more strongly supported than the MM theory. If we compare $\sigma(_A\beta)$ to $\sigma(_B\beta)$ by risk-classes in Table 4, precisely the same results are obtained as those reported above for the continuously-compounded betas.

13. By risk-classes, seven of the nine chi-square values of $_A\beta$ are larger than those of $_B\beta$, as are eight out of nine for the continuously-compounded betas. This would occur by chance with probabilities of 0.0898 and 0.0195, respectively, if there were a 50% chance that either the firm or stock chi-square value could be larger. Nevertheless, if we inspect the individual chi-square values by risk-class, we note that most of them are large so that the probabilities of obtaining these values are highly unlikely. For all four βs, the distributions for most of the risk-classes are nonuniform.

14. Primary metals have extremely large betas; utilities have extremely small betas.

two industries, and also two miscellaneous firms so that an even 250 firms are in the sample, new upper and lower values of the β's were obtained for each of the ten class intervals and for each of the four β's.

In Table 5, the chi-square values are presented; for the total of all risk-classes, the probability of obtaining a chi-square value less than 120.63 is over 99.95% (for $_A\beta$), whereas the probability of obtaining a chi-square value less than 99.75 is between 99.5% and 99.9% (for $_B\beta$). More sharply contrasting results are obtained when $_{AC}\beta$ is compared to $_{BC}\beta$. For $_{AC}\beta$, the probability of obtaining less than 128.47 is over 99.95%, whereas for $_{BC}\beta$, the probability of obtaining less than 78.65 is only 90.0%. By abstracting from financial risk, the underlying systematic risk is much less scattered when grouped into risk-classes than when leverage is assumed not to affect the systematic risk. The null hypothesis that the β's in a risk-class come from the same distribution as all β's is rejected for $_{AC}\beta$, but not for $_{BC}\beta$ (at the 90% level). Although this, in itself, does not tell us *how* a risk-class differs from the total market, an inspection of the distributions of the betas by risk-class underlying Table 5 does indicate more clustering of the $_{AC}\beta$s than the $_{BC}\beta$s so that the MM theory is again favored over the traditional theory.

The analysis of variance test is our last comparison of the implications of the two theories. The ratio of the estimated variance between industries to the estimated variance within the industries (the F-statistic) when the seven

TABLE 5
CHI-SQUARE RESULTS FOR ALL β'S AND ALL INDUSTRIES
(EXCEPT UTILITIES AND PRIMARY METALS)

Industry		$_A\beta$	$_B\beta$	$_{AC}\beta$	$_{BC}\beta$
Food and Kindred	Chi-Square	18.67	11.33	26.00	9.33
	$P\{\chi^2 <\}^* =$	95-97.5%	70-75%	99.5-99.9%	50-60%
Chemicals	Chi-Square	9.33	10.67	12.00	7.33
	$P\{\chi^2 <\} =$	50-60%	60-70%	75-80%	30-40%
Petroleum	Chi-Square	17.56	25.33	18.67	22.00
	$P\{\chi^2 <\} =$	95-97.5%	99.5-99.9%	95-97.5%	99-99.5%
Machinery	Chi-Square	19.14	12.00	24.86	9.14
	$P\{\chi^2 <\} =$	97.5-98%	75-80%	99.5-99.9%	50-60%
Electrical Machinery	Chi-Square	13.92	7.77	12.38	9.31
	$P\{\chi^2 <\} =$	80-90%	40-50%	80-90%	50-60%
Transportation Equipment	Chi-Square	15.17	16.83	13.50	6.83
	$P\{\chi^2 <\} =$	90-95%	90-95%	80-90%	30-40%
Dep't Stores	Chi-Square	14.18	3.59	14.18	3.59
	$P\{\chi^2 <\} =$	80-90%	5-10%	80-90%	5-10%
Miscellaneous	Chi-Square	12.67	12.22	6.89	11.11
	$P\{\chi^2 <\} =$	80-90%	80-90%	30-40%	70-75%
Total	Chi-Square	120.63	99.75	128.47	78.65
	$P\{\chi^2 <\} =$	over 99.95%	99.5-99.90%	over 99.95%	90.0%

* Example: $P\{\chi^2 < 18.67\} = 95\text{-}97.5\%$ for 9 degrees of freedom.

industries are considered (again, the two obviously skewed industries, primary metals and utilities, were eliminated) is less for $_B\beta$ (F = 3.90) than for $_A\beta$ (F = 9.99), and less for $_{BC}\beta$ (F = 4.18) than for $_{AC}\beta$ (F = 10.83). The probability of obtaining these F-statistics for $_A\beta$ and $_{AC}\beta$ is less than 0.001, but for $_B\beta$ and $_{BC}\beta$ greater than or equal to 0.001. These results are consistent with the results obtained from our two previous tests. The MM theory is more compatible with the data than the traditional theory.[15]

V. Conclusions

This study attempted to tie together some of the notions associated with the field of corporation finance with those associated with security and portfolio analyses. Specifically, if the MM corporate tax leverage propositions are correct, then approximately 21 to 24% of the observed systematic risk of common stocks (when averaged over 304 firms) can be explained merely by the added financial risk taken on by the underlying firm with its use of debt and preferred stock. Corporate leverage does count considerably.

To determine whether the MM theory is correct, a number of tests on a contrasting implication of the MM and "traditional" theories of corporation finance were performed. The data confirmed MM's position, at least vis-à-vis our interpretation of the traditional theory's position. This should provide another piece of evidence on this controversial topic.

Finally, if the MM theory and the capital asset pricing model are correct, and if the adjustments made in equations (8) or (4a) result in accurate measures of the systematic risk of a leverage-free firm, the possibility is greater, without resorting to a fullblown risk-class study of the type MM did for the electric utility industry [8], of estimating the cost of capital for individual firms.

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15. All of our tests, it should be emphasized, although consistent, are only inferential. Aside from assuming that the two-digit SEC industry classification is a good proxy for risk-classes and that the errors in estimating the individual βs can be safely ignored, the tests rely on the two theories exhausting all the reasonable theories on leverage. But there is always the use of another line of reasoning. If the results of the MM electric utility study [8] are correct, and if these results can be generalized to all firms and to all risk-classes, then it can be claimed that the MM theory is universally valid. Then our result in Section III does indicate the correct effect of the firm's capital structure on the systematic risk of common stocks.

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Standard & Poor's

ANALYSTS' HANDBOOK

April 2016
Monthly Supplement

S&P 500

Quarter	Price 1941-1943 = 10 High	Low	Close	Diluted Earnings Qtr'ly	4 Qtrs Total	Basic Earnings Qtr'ly	4 Qtrs Total	Diluted Price/Earn Ratio High	Low	Close	Dividends Qtr'ly	4 Qtrs Total	% of Diluted EPS	Yield % High	Low	Close	Total Return Index
2012 Q2	1419.04	1278.05	1362.16	21.62	87.92	21.91	89.05	16.14	14.54	15.49	7.45	28.32	32.21	2.22	2.00	2.08	2363.79
2012 Q3	1465.77	1334.76	1440.68	21.21	86.50	21.47	87.62	16.95	15.43	16.66	7.77	29.59	34.20	2.22	2.02	2.05	2513.93
2012 Q4	1461.40	1353.33	1426.19	20.65	86.51	20.93	87.60	16.89	15.64	16.49	8.94	31.24	36.11	2.31	2.14	2.19	2504.44
2013 Q1	1569.19	1457.15	1569.19	24.22	87.71	24.49	88.80	17.89	16.61	17.89	7.95	32.11	36.61	2.20	2.05	2.05	2770.05
2013 Q2	1669.16	1541.61	1606.28	24.87	90.95	25.19	92.07	18.35	16.95	17.66	8.61	33.27	36.58	2.16	1.99	2.07	2850.66
2013 Q3	1725.52	1614.08	1681.55	24.63	94.38	24.94	95.55	18.28	17.10	17.82	8.91	34.40	36.45	2.13	1.99	2.05	3000.18
2013 Q4	1848.36	1655.45	1848.36	26.48	100.20	26.85	101.47	18.45	16.52	18.45	9.52	34.99	34.92	2.11	1.89	1.89	3315.59
2014 Q1	1878.04	1741.89	1872.34	24.87	100.85	25.18	102.16	18.62	17.27	18.57	9.19	36.23	35.92	2.08	1.93	1.94	3375.51
2014 Q2	1962.87	1815.69	1960.23	27.14	103.12	27.49	104.46	19.04	17.61	19.01	9.76	37.38	36.25	2.06	1.90	1.91	3552.18
2014 Q3	2011.36	1909.57	1972.29	27.47	105.96	27.84	107.35	18.98	18.02	18.61	10.02	38.49	36.33	2.02	1.91	1.95	3592.25
2014 Q4	2090.57	1862.49	2058.90	22.83	102.31	23.21	103.71	20.43	18.20	20.12	10.47	39.44	38.55	2.12	1.89	1.92	3769.44
2015 Q1	2117.39	1992.67	2067.89	21.81	99.25	22.13	100.66	21.33	20.08	20.84	10.55	40.81	41.12	2.05	1.93	1.97	3805.27
2015 Q2	2130.82	2057.64	2063.11	22.80	94.91	23.13	96.30	22.45	21.68	21.74	10.70	41.74	43.98	2.03	1.96	2.02	3815.85
2015 Q3	2128.28	1867.61	1920.03	23.22	90.66	23.50	91.97	23.48	20.60	21.18	10.79	42.51	46.89	2.28	2.00	2.21	3570.17
2015 Q4	2109.79	1923.82	2043.94	18.70	86.52	19.02	87.78	24.38	22.24	23.62	11.35	43.39	50.15	2.26	2.06	2.12	3821.60
2016 Q1	2063.95	1829.08	2059.74	....	....	....	....	....	....	....	11.04	43.88	....	2.40	2.13	2.13	3873.11
			2059.74	*2016 Earnings 136.1 (2015-E119.7) 13.7*						*15.13*		*45.00*				*2.18*	*3873.11*

Energy (10)

Quarter	Price 30-Dec-94 = 100 High	Low	Close	Sales Qtr'ly	4 Qtrs Total	Diluted Earnings Qtr'ly	4 Qtrs Total	% of Sales	Basic Earnings Qtr'ly	4 Qtrs Total	% of Sales	Diluted Price/Earn Ratio High	Low	Close	Dividends Qtr'ly	4 Qtrs Total	% of Diluted EPS	Yield % High	Low	Close	Total Return Index
2012 Q2	543.41	466.27	503.27	145.39	579.64	13.38	46.63	8.05	13.47	46.95	8.10	11.65	10.00	10.79	2.87	10.55	22.62	2.26	1.94	2.10	752.40
2012 Q3	569.90	491.77	551.19	140.93	574.99	9.80	44.55	7.75	9.85	44.81	7.79	12.79	11.04	12.37	3.02	11.06	24.83	2.25	1.94	2.01	828.72
2012 Q4	562.19	511.96	532.96	140.73	572.24	9.59	44.48	7.77	9.64	44.72	7.82	12.64	11.51	11.98	3.07	11.58	26.03	2.26	2.06	2.17	805.96
2013 Q1	586.62	544.08	583.99	134.07	561.12	10.76	43.53	7.76	10.81	43.76	7.80	13.48	12.50	13.42	3.15	12.10	27.81	2.22	2.06	2.07	887.95
2013 Q2	610.39	548.87	578.54	138.06	553.78	11.71	41.86	7.56	11.79	42.08	7.60	14.58	13.11	13.82	3.37	12.61	30.12	2.30	2.07	2.18	884.68
2013 Q3	620.75	581.76	604.86	142.89	555.74	10.12	42.17	7.59	10.15	42.39	7.63	14.72	13.80	14.34	3.47	13.06	30.96	2.24	2.10	2.16	930.27
2013 Q4	651.67	597.37	651.67	139.27	554.29	9.24	41.83	7.55	9.30	42.04	7.59	15.58	14.28	15.58	3.58	13.57	32.44	2.27	2.08	2.08	1007.99
2014 Q1	652.98	598.77	652.90	137.38	557.60	9.98	41.05	7.36	10.04	41.27	7.40	15.91	14.59	15.91	3.69	14.11	34.37	2.36	2.16	2.16	1015.93
2014 Q2	737.09	648.80	727.63	144.23	563.77	11.41	40.75	7.23	11.46	40.95	7.26	18.09	15.92	17.86	4.00	14.74	36.17	2.27	2.00	2.03	1138.80
2014 Q3	733.44	661.06	661.06	140.55	561.43	11.69	42.32	7.54	11.76	42.55	7.58	17.33	15.62	15.62	4.09	15.35	36.27	2.32	2.09	2.32	1040.64
2014 Q4	648.71	540.03	586.59	117.74	539.90	2.15	35.24	6.53	2.21	35.46	6.57	18.41	15.33	16.65	4.09	15.86	45.02	2.94	2.45	2.70	929.53
2015 Q1	604.28	542.06	565.76	87.59	490.11	-1.80	23.45	4.79	-1.79	23.64	4.82	25.77	23.11	24.12	4.20	16.37	69.81	3.02	2.71	2.89	903.01
2015 Q2	605.07	547.54	551.11	96.05	441.92	-1.50	10.54	2.39	-1.48	10.69	2.42	57.38	51.93	52.27	4.22	16.60	157.41	3.03	2.74	3.01	886.02
2015 Q3	546.28	432.40	451.33	86.47	387.84	-6.01	-7.16	-1.85	-6.00	-7.07	-1.82	-76.30	-60.40	-63.04	4.22	16.73	-233.70	3.87	3.06	3.71	731.75
2015 Q4	527.38	438.48	448.44	75.09	345.19	-14.21	-23.52	-6.81	-14.20	-23.48	-6.80	-22.42	-18.64	-19.07	4.20	16.84	-71.61	3.84	3.19	3.76	733.24
2016 Q1	473.36	388.58	462.41	....	....	....	....	....	....	....	....	....	....	....	3.65	16.30	....	4.19	3.44	3.52	762.70
			462.41			*2016 Earnings 16.65 (2015-E4.37) 280.9*								*28.68*		*14.49*				*3.03*	*762.70*

7/18

THE VALUE LINE® Investment Survey®

Part 1
Summary & Index

File at the front of the *Ratings & Reports* binder. Last week's *Summary & Index* should be removed.

April 1, 2016

TABLE OF SUMMARY & INDEX CONTENTS

Summary & Index Page Number

SCREENS

The Median of Estimated
PRICE-EARNINGS RATIOS
of all stocks with earnings

18.2

26 Weeks Ago	Market Low 3-9-09	Market High 5-21-15
17.2	10.3	19.3

The Median of Estimated
DIVIDEND YIELDS
(next 12 months) of all dividend paying stocks under review

2.3%

26 Weeks Ago	Market Low 3-9-09	Market High 5-21-15
2.3%	4.0%	2.0%

The Estimated Median Price
APPRECIATION POTENTIAL
of all 1700 stocks in the Value Line universe in the hypothesized economic environment 3 to 5 years hence

50%

26 Weeks Ago	Market Low 3-9-09	Market High 5-21-15
50%	185%	35%

ANALYSES OF INDUSTRIES IN ALPHABETICAL ORDER WITH PAGE NUMBER

Numeral in parenthesis after the industry is rank for probable performance (next 12 months).

*Reviewed in this week's issue.

In three parts: This is Part 1, the Summary & Index. Part 2 is Selection & Opinion. Part 3 is Ratings & Reports. Volume LXXI, No. 33.
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Fundamentals of Financial Management

Fifth Edition

Eugene F. Brigham
University of Florida

The Dryden Press
Chicago Fort Worth San Francisco Philadelphia Montreal Toronto London Sydney Tokyo

Costs of Capital for Projects of Differing Riskiness. As noted in Chapter 11, care must be taken to assign different risk-adjusted discount rates to capital budgeting projects of differing degrees of riskiness.

Capital Structure Weights. In this chapter we have simply taken as given the target capital structure and used this target to obtain the weights used to calculate k. As we shall see in Chapter 17, establishing the target capital structure is a major task in itself.

Dynamic Considerations. Capital budgeting and cost of capital estimates are a part of the *planning process* — they deal with ex ante, or estimated, data rather than ex post, or historical data. Hence, we can be wrong about the location of the IOS and the MCC. For example, we can underestimate the MCC and hence accept projects that, with 20-20 hindsight, we should have rejected. In a dynamic, changing world this is a real problem. Interest rates and money costs could be low at the time plans are being laid and contracts to build plants are being let, but six or eight months later these capital costs could have risen substantially. Thus, a project that formerly looked good could turn out to be a bad one because we improperly forecasted the MCC schedule.

Although this listing of problem areas may appear formidable, the state of the art in cost of capital estimation is really not in bad shape. The procedures outlined in this chapter can be used to obtain cost of capital estimates that are sufficiently accurate for practical purposes, and the problems listed here merely indicate the desirability of certain refinements. The refinements are not unimportant, but the problems we have identified do not invalidate the usefulness of the procedures outlined in the chapter.

Small Business

COST OF EQUITY CAPITAL FOR SMALL FIRMS

The three equity cost estimating techniques that were discussed in this chapter have serious limitations when applied to small firms, thus increasing the need for the small-business manager to use judgment. Consider first the constant growth model, $k_s = D_1/P_0 + g$. Imagine a small, rapidly growing firm, such as Bio-Technology General (BTG), which does not now and will not in the foreseeable future pay dividends. For firms like this, the constant growth model is simply not applicable. In fact, it is difficult to imagine any dividend model that would be of practical benefit for such a firm because of the difficulty of estimating growth rates.

The method which calls for adding a risk premium of about 3 percent to the firm's cost of debt can be used for some small firms, but problems arise if the firm does not have a fixed rate issue outstanding. BTG, for example, has no such debt issue outstanding, so we could not use the bond-yield-plus-risk-premium approach for BTG.

The third approach, the CAPM, is also often unusable because if the firm's stock is not publicly traded, then we cannot calculate the firm's beta. For the privately owned firm, we might use the so-called "pure play" CAPM technique. This involves finding a firm in the same line of business that does have public equity, estimating its beta, and then using this beta as a proxy for that of the small business in question.

To illustrate the pure play approach, again consider BTG. The firm is not publicly traded, so we cannot estimate its beta. However, data are available on more established firms, such as Genentech and Genetic Industries, so we could use their betas as representative of the biological and genetic engineering industry. Of course, these firms' betas would have to be subjectively modified to reflect their larger sizes and more established positions, as well as to take account of the differences in the nature of their products and their capital structures as compared to those of BTG. Still, as long as there are public companies in similar lines of business available for comparison, the estimates of their betas can be used to help estimate the cost of capital of a firm whose equity is not publicly traded. Note that a "liquidity premium" as discussed in Chapter 3 would also have to be added to reflect the illiquidity of the small, nonpublic firm's stock.

Flotation Costs for Small Issues

When external equity capital is raised, flotation costs increase the cost of equity capital beyond what it would be for internal funds. These external flotation costs are especially significant for smaller firms, and they can substantially affect capital budgeting decisions involving external equity funds. To illustrate this point, consider a firm that is expected to pay constant dividends forever, and hence whose growth rate is zero. In this case, if F is the percentage flotation cost, then the cost of equity capital is $k_e = D_1/[P_0(1 - F)]$. The higher the flotation cost, the higher the cost of external equity.

How big is F? According to the latest Securities and Exchange Commission data, the average flotation cost of large common stock offerings (more than $50 million) is only about 4 percent. For a firm that is expected to provide a 15 percent dividend yield (that is, $D_1/P_0 = 15\%$), the cost of equity is $15\%/(1 - 0.04)$, or 15.6 percent. However, the SEC's data on small stock offerings (less than $1 million) show that flotation costs for such issues average about 21 percent. Thus, the cost of equity capital in the preceding example would be $15\%/(1 - 0.21)$, or about 19 percent. When we compare this to the 15.6 percent for large offerings, it is clear that a small firm would have to earn considerably more on the same project than a large firm. Small firms are therefore at a substantial disadvantage because of the effects of flotation costs.

The Small-Firm Effect

A number of researchers have observed that portfolios of small-firm stocks have earned consistently higher average returns than those of large-firm stocks; this is called the "small-firm effect." On the surface, it would seem to be advantageous to the small firm to provide average returns in the stock market that are higher than those of large firms. In reality, it is bad news for the small firm; what the small-firm effect means is that the capital market demands higher returns on stocks of small firms than on otherwise similar stocks of large firms. Therefore, the cost of equity capital is higher for small firms. This compounds the high flotation cost problem noted above.

It may be argued that stocks of small firms are riskier than those of large ones and that this accounts for the differences in returns. It is true that academic research usually finds that betas are higher on average for small firms than for large ones. However, the larger returns for small firms remain larger even after adjusting for the effects of their higher risks as reflected in their beta coefficients.

The small-firm effect is an anomaly in the sense that it is not consistent with the CAPM theory. Still, higher returns reflect a higher cost of capital, so we must conclude that smaller firms do have higher capital costs than otherwise similar larger firms. The manager of a small firm should take this factor into account when estimating his or her firm's cost of equity capital. In general, the cost of equity capital appears to be about four percentage points higher for small firms (those with market values of less than $20 million) than for large, New York Stock Exchange firms with similar risk characteristics.

The Cross-Section of Expected Stock Returns

Eugene F. Fama; Kenneth R. French

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The Cross-Section of Expected Stock Returns

EUGENE F. FAMA and KENNETH R. FRENCH*

ABSTRACT

Two easily measured variables, size and book-to-market equity, combine to capture the cross-sectional variation in average stock returns associated with market β, size, leverage, book-to-market equity, and earnings-price ratios. Moreover, when the tests allow for variation in β that is unrelated to size, the relation between market β and average return is flat, even when β is the only explanatory variable.

THE ASSET-PRICING MODEL OF Sharpe (1964), Lintner (1965), and Black (1972) has long shaped the way academics and practitioners think about average returns and risk. The central prediction of the model is that the market portfolio of invested wealth is mean-variance efficient in the sense of Markowitz (1959). The efficiency of the market portfolio implies that (a) expected returns on securities are a positive linear function of their market βs (the slope in the regression of a security's return on the market's return), and (b) market βs suffice to describe the cross-section of expected returns.

There are several empirical contradictions of the Sharpe-Lintner-Black (SLB) model. The most prominent is the size effect of Banz (1981). He finds that market equity, ME (a stock's price times shares outstanding), adds to the explanation of the cross-section of average returns provided by market βs. Average returns on small (low ME) stocks are too high given their β estimates, and average returns on large stocks are too low.

Another contradiction of the SLB model is the positive relation between leverage and average return documented by Bhandari (1988). It is plausible that leverage is associated with risk and expected return, but in the SLB model, leverage risk should be captured by market β. Bhandari finds, however, that leverage helps explain the cross-section of average stock returns in tests that include size (ME) as well as β.

Stattman (1980) and Rosenberg, Reid, and Lanstein (1985) find that average returns on U.S. stocks are positively related to the ratio of a firm's book value of common equity, BE, to its market value, ME. Chan, Hamao, and Lakonishok (1991) find that book-to-market equity, BE/ME, also has a strong role in explaining the cross-section of average returns on Japanese stocks.

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Finally, Basu (1983) shows that earnings-price ratios (E/P) help explain the cross-section of average returns on U.S. stocks in tests that also include size and market β. Ball (1978) argues that E/P is a catch-all proxy for unnamed factors in expected returns; E/P is likely to be higher (prices are lower relative to earnings) for stocks with higher risks and expected returns, whatever the unnamed sources of risk.

Ball's proxy argument for E/P might also apply to size (ME), leverage, and book-to-market equity. All these variables can be regarded as different ways to scale stock prices, to extract the information in prices about risk and expected returns (Keim (1988)). Moreover, since E/P, ME, leverage, and BE/ME are all scaled versions of price, it is reasonable to expect that some of them are redundant for describing average returns. Our goal is to evaluate the joint roles of market β, size, E/P, leverage, and book-to-market equity in the cross-section of average returns on NYSE, AMEX, and NASDAQ stocks.

Black, Jensen, and Scholes (1972) and Fama and MacBeth (1973) find that, as predicted by the SLB model, there is a positive simple relation between average stock returns and β during the pre-1969 period. Like Reinganum (1981) and Lakonishok and Shapiro (1986), we find that the relation between β and average return disappears during the more recent 1963–1990 period, even when β is used alone to explain average returns. The appendix shows that the simple relation between β and average return is also weak in the 50-year 1941–1990 period. In short, our tests do not support the most basic prediction of the SLB model, that average stock returns are positively related to market βs.

Unlike the simple relation between β and average return, the univariate relations between average return and size, leverage, E/P, and book-to-market equity are strong. In multivariate tests, the negative relation between size and average return is robust to the inclusion of other variables. The positive relation between book-to-market equity and average return also persists in competition with other variables. Moreover, although the size effect has attracted more attention, book-to-market equity has a consistently stronger role in average returns. Our bottom-line results are: (a) β does not seem to help explain the cross-section of average stock returns, and (b) the combination of size and book-to-market equity seems to absorb the roles of leverage and E/P in average stock returns, at least during our 1963–1990 sample period.

If assets are priced rationally, our results suggest that stock risks are multidimensional. One dimension of risk is proxied by size, ME. Another dimension of risk is proxied by BE/ME, the ratio of the book value of common equity to its market value.

It is possible that the risk captured by BE/ME is the relative distress factor of Chan and Chen (1991). They postulate that the earning prospects of firms are associated with a risk factor in returns. Firms that the market judges to have poor prospects, signaled here by low stock prices and high ratios of book-to-market equity, have higher expected stock returns (they are penalized with higher costs of capital) than firms with strong prospects. It is also possible, however, that BE/ME just captures the unraveling (regression toward the mean) of irrational market whims about the prospects of firms.

Whatever the underlying economic causes, our main result is straightforward. Two easily measured variables, size (ME) and book-to-market equity (BE/ME), provide a simple and powerful characterization of the cross-section of average stock returns for the 1963–1990 period.

In the next section we discuss the data and our approach to estimating β. Section II examines the relations between average return and β and between average return and size. Section III examines the roles of E/P, leverage, and book-to-market equity in average returns. In sections IV and V, we summarize, interpret, and discuss applications of the results.

I. Preliminaries

A. Data

We use all nonfinancial firms in the intersection of (a) the NYSE, AMEX, and NASDAQ return files from the Center for Research in Security Prices (CRSP) and (b) the merged COMPUSTAT annual industrial files of income-statement and balance-sheet data, also maintained by CRSP. We exclude financial firms because the high leverage that is normal for these firms probably does not have the same meaning as for nonfinancial firms, where high leverage more likely indicates distress. The CRSP returns cover NYSE and AMEX stocks until 1973 when NASDAQ returns also come on line. The COMPUSTAT data are for 1962–1989. The 1962 start date reflects the fact that book value of common equity (COMPUSTAT item 60), is not generally available prior to 1962. More important, COMPUSTAT data for earlier years have a serious selection bias; the pre-1962 data are tilted toward big historically successful firms.

To ensure that the accounting variables are known before the returns they are used to explain, we match the accounting data for all fiscal yearends in calendar year $t - 1$ (1962–1989) with the returns for July of year t to June of $t + 1$. The 6-month (minimum) gap between fiscal yearend and the return tests is conservative. Earlier work (e.g., Basu (1983)) often assumes that accounting data are available within three months of fiscal yearends. Firms are indeed required to file their 10-K reports with the SEC within 90 days of their fiscal yearends, but on average 19.8% do not comply. In addition, more than 40% of the December fiscal yearend firms that do comply with the 90-day rule file on March 31, and their reports are not made public until April. (See Alford, Jones, and Zmijewski (1992).)

We use a firm's market equity at the end of December of year $t - 1$ to compute its book-to-market, leverage, and earnings-price ratios for $t - 1$, and we use its market equity for June of year t to measure its size. Thus, to be included in the return tests for July of year t, a firm must have a CRSP stock price for December of year $t - 1$ and June of year t. It must also have monthly returns for at least 24 of the 60 months preceding July of year t (for "pre-ranking" β estimates, discussed below). And the firm must have COMPUSTAT data on total book assets (A), book equity (BE), and earnings (E), for its fiscal year ending in (any month of) calendar year $t - 1$.

Our use of December market equity in the E/P, BE/ME, and leverage ratios is objectionable for firms that do not have December fiscal yearends because the accounting variable in the numerator of a ratio is not aligned with the market value in the denominator. Using ME at fiscal yearends is also problematic; then part of the cross-sectional variation of a ratio for a given year is due to market-wide variation in the ratio during the year. For example, if there is a general fall in stock prices during the year, ratios measured early in the year will tend to be lower than ratios measured later. We can report, however, that the use of fiscal-yearend MEs, rather than December MEs, in the accounting ratios has little impact on our return tests.

Finally, the tests mix firms with different fiscal yearends. Since we match accounting data for all fiscal yearends in calendar year $t - 1$ with returns for July of t to June of $t + 1$, the gap between the accounting data and the matching returns varies across firms. We have done the tests using the smaller sample of firms with December fiscal yearends with similar results.

B. Estimating Market βs

Our asset-pricing tests use the cross-sectional regression approach of Fama and MacBeth (1973). Each month the cross-section of returns on stocks is regressed on variables hypothesized to explain expected returns. The time-series means of the monthly regression slopes then provide standard tests of whether different explanatory variables are on average priced.

Since size, E/P, leverage, and BE/ME are measured precisely for individual stocks, there is no reason to smear the information in these variables by using portfolios in the Fama-MacBeth (FM) regressions. Most previous tests use portfolios because estimates of market βs are more precise for portfolios. Our approach is to estimate βs for portfolios and then assign a portfolio's β to each stock in the portfolio. This allows us to use individual stocks in the FM asset-pricing tests.

B.1. β Estimation: Details

In June of each year, all NYSE stocks on CRSP are sorted by size (ME) to determine the NYSE decile breakpoints for ME. NYSE, AMEX, and NASDAQ stocks that have the required CRSP-COMPUSTAT data are then allocated to 10 size portfolios based on the NYSE breakpoints. (If we used stocks from all three exchanges to determine the ME breakpoints, most portfolios would include only small stocks after 1973, when NASDAQ stocks are added to the sample.)

We form portfolios on size because of the evidence of Chan and Chen (1988) and others that size produces a wide spread of average returns and βs. Chan and Chen use only size portfolios. The problem this creates is that size and the βs of size portfolios are highly correlated (-0.988 in their data), so asset-pricing tests lack power to separate size from β effects in average returns.

To allow for variation in β that is unrelated to size, we subdivide each size decile into 10 portfolios on the basis of pre-ranking βs for individual stocks. The pre-ranking βs are estimated on 24 to 60 monthly returns (as available) in the 5 years before July of year t. We set the β breakpoints for each size decile using only NYSE stocks that satisfy our COMPUSTAT-CRSP data requirements for year $t - 1$. Using NYSE stocks ensures that the β breakpoints are not dominated after 1973 by the many small stocks on NASDAQ. Setting β breakpoints with stocks that satisfy our COMPUSTAT-CRSP data requirements guarantees that there are firms in each of the 100 size-β portfolios.

After assigning firms to the size-β portfolios in June, we calculate the equal-weighted monthly returns on the portfolios for the next 12 months, from July to June. In the end, we have post-ranking monthly returns for July 1963 to December 1990 on 100 portfolios formed on size and pre-ranking βs. We then estimate βs using the full sample (330 months) of post-ranking returns on each of the 100 portfolios, with the CRSP value-weighted portfolio of NYSE, AMEX, and (after 1972) NASDAQ stocks used as the proxy for the market. We have also estimated βs using the value-weighted or the equal-weighted portfolio of NYSE stocks as the proxy for the market. These βs produce inferences on the role of β in average returns like those reported below.

We estimate β as the sum of the slopes in the regression of the return on a portfolio on the current and prior month's market return. (An additional lead and lag of the market have little effect on these sum βs.) The sum βs are meant to adjust for nonsynchronous trading (Dimson (1979)). Fowler and Rorke (1983) show that sum βs are biased when the market return is autocorrelated. The 1st- and 2nd-order autocorrelations of the monthly market returns for July 1963 to December 1990 are 0.06 and -0.05, both about 1 standard error from 0. If the Fowler-Rorke corrections are used, they lead to trivial changes in the βs. We stick with the simpler sum βs. Appendix Table AI shows that using sum βs produces large increases in the βs of the smallest ME portfolios and small declines in the βs of the largest ME portfolios.

Chan and Chen (1988) show that full-period β estimates for portfolios can work well in tests of the SLB model, even if the true βs of the portfolios vary through time, if the variation in the βs is proportional,

$$\beta_{jt} - \beta_j = k_t(\beta_j - \beta), \tag{1}$$

where β_{jt} is the true β for portfolio j at time t, β_j is the mean of β_{jt} across t, and β is the mean of the β_j. The Appendix argues that (1) is a good approximation for the variation through time in the true βs of portfolios (j) formed on size and β. For diehard β fans, sure to be skeptical of our results on the weak role of β in average stock returns, we can also report that the results stand up to robustness checks that use 5-year pre-ranking βs, or 5-year post-ranking βs, instead of the full-period post-ranking βs.

We allocate the full-period post-ranking β of a size-β portfolio to each stock in the portfolio. These are the βs that will be used in the Fama-MacBeth cross-sectional regressions for individual stocks. We judge that the precision of the full-period post-ranking portfolio βs, relative to the imprecise β estimates that would be obtained for individual stocks, more than makes up for the fact that true βs are not the same for all stocks in a portfolio. And note that assigning full-period portfolio βs to stocks does not mean that a stock's β is constant. A stock can move across portfolios with year-to-year changes in the stock's size (ME) and in the estimates of its β for the preceding 5 years.

B.2. β Estimates

Table I shows that forming portfolios on size and pre-ranking βs, rather than on size alone, magnifies the range of full-period post-ranking βs. Sorted on size alone, the post-ranking βs range from 1.44 for the smallest ME portfolio to 0.92 for the largest. This spread of βs across the 10 size deciles is smaller than the spread of post-ranking βs produced by the β sort of *any* size decile. For example, the post-ranking βs for the 10 portfolios in the smallest size decile range from 1.05 to 1.79. Across all 100 size-β portfolios, the post-ranking βs range from 0.53 to 1.79, a spread 2.4 times the spread, 0.52, obtained with size portfolios alone.

Two other facts about the βs are important. First, in each size decile the post-ranking βs closely reproduce the ordering of the pre-ranking βs. We take this to be evidence that the pre-ranking β sort captures the ordering of true post-ranking βs. (The appendix gives more evidence on this important issue.) Second, the β sort is not a refined size sort. In any size decile, the average values of ln(ME) are similar across the β-sorted portfolios. Thus the pre-ranking β sort achieves its goal. It produces strong variation in post-ranking βs that is unrelated to size. This is important in allowing our tests to distinguish between β and size effects in average returns.

II. β and Size

The Sharpe-Lintner-Black (SLB) model plays an important role in the way academics and practitioners think about risk and the relation between risk and expected return. We show next that when common stock portfolios are formed on size alone, there seems to be evidence for the model's central prediction: average return is positively related to β. The βs of size portfolios are, however, almost perfectly correlated with size, so tests on size portfolios are unable to disentangle β and size effects in average returns. Allowing for variation in β that is unrelated to size breaks the logjam, but at the expense of β. Thus, when we subdivide size portfolios on the basis of pre-ranking βs, we find a strong relation between average return and size, but no relation between average return and β.

A. *Informal Tests*

Table II shows post-ranking average returns for July 1963 to December 1990 for portfolios formed from one-dimensional sorts of stocks on size or β. The portfolios are formed at the end of June each year and their equal-weighted returns are calculated for the next 12 months. We use returns for July to June to match the returns in later tests that use the accounting data. When we sort on just size or 5-year pre-ranking βs, we form 12 portfolios. The middle 8 cover deciles of size or β. The 4 extreme portfolios (1A, 1B, 10A, and 10B) split the bottom and top deciles in half.

Table II shows that when portfolios are formed on size alone, we observe the familiar strong negative relation between size and average return (Banz (1981)), and a strong positive relation between average return and β. Average returns fall from 1.64% per month for the smallest ME portfolio to 0.90% for the largest. Post-ranking βs also decline across the 12 size portfolios, from 1.44 for portfolio 1A to 0.90 for portfolio 10B. Thus, a simple size sort seems to support the SLB prediction of a positive relation between β and average return. But the evidence is muddied by the tight relation between size and the βs of size portfolios.

The portfolios formed on the basis of the ranked market βs of stocks in Table II produce a wider range of βs (from 0.81 for portfolio 1A to 1.73 for 10B) than the portfolios formed on size. Unlike the size portfolios, the β-sorted portfolios do not support the SLB model. There is little spread in average returns across the β portfolios, and there is no obvious relation between β and average returns. For example, although the two extreme portfolios, 1A and 10B, have much different βs, they have nearly identical average returns (1.20% and 1.18% per month). These results for 1963–1990 confirm Reinganum's (1981) evidence that for β-sorted portfolios, there is no relation between average return and β during the 1964–1979 period.

The 100 portfolios formed on size and then pre-ranking β in Table I clarify the contradictory evidence on the relation between β and average return produced by portfolios formed on size or β alone. Specifically, the two-pass sort gives a clearer picture of the separate roles of size and β in average returns. Contrary to the central prediction of the SLB model, the second-pass β sort produces little variation in average returns. Although the post-ranking βs in Table I increase strongly in each size decile, average returns are flat or show a slight tendency to decline. In contrast, within the columns of the average return and β matrices of Table I, average returns and βs decrease with increasing size.

The two-pass sort on size and β in Table I says that variation in β that is tied to size is positively related to average return, but variation in β unrelated to size is not compensated in the average returns of 1963–1990. The proper inference seems to be that there is a relation between size and average return, but controlling for size, there is no relation between β and average return. The regressions that follow confirm this conclusion, and they produce another that is stronger. The regressions show that when one allows

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 9 of 40

Table I

Average Returns, Post-Ranking βs and Average Size For Portfolios Formed on Size and then β: Stocks Sorted on ME (Down) then Pre-Ranking β (Across): July 1963 to December 1990

Portfolios are formed yearly. The breakpoints for the size (ME, price times shares outstanding) deciles are determined in June of year t (t = 1963–1990) using all NYSE stocks on CRSP. All NYSE, AMEX, and NASDAQ stocks that meet the CRSP-COMPUSTAT data requirements are allocated to the 10 size portfolios using the NYSE breakpoints. Each size decile is subdivided into 10 β portfolios using pre-ranking βs of individual stocks, estimated with 2 to 5 years of monthly returns (as available) ending in June of year t. We use only NYSE stocks that meet the CRSP-COMPUSTAT data requirements to establish the β breakpoints. The equal-weighted monthly returns on the resulting 100 portfolios are then calculated for July of year t to June of year $t + 1$.

The post-ranking βs use the full (July 1963 to December 1990) sample of post-ranking returns for each portfolio. The pre- and post-ranking βs (here and in all other tables) are the sum of the slopes from a regression of monthly returns on the current and prior month's returns on the value-weighted portfolio of NYSE, AMEX, and (after 1972) NASDAQ stocks. The average return is the time-series average of the monthly equal-weighted portfolio returns, in percent. The average size of a portfolio is the time-series average of monthly averages of ln(ME) for stocks in the portfolio at the end of June of each year, with ME denominated in millions of dollars.

The average number of stocks per month for the size-β portfolios in the smallest size decile varies from 70 to 177. The average number of stocks for the size-β portfolios in size deciles 2 and 3 is between 15 and 41, and the average number for the largest 7 size deciles is between 11 and 22.

The All column shows statistics for equal-weighted size-decile (ME) portfolios. The All row shows statistics for equal-weighted portfolios of the stocks in each β group.

	All	Low-β	β-2	β-3	β-4	β-5	β-6	β-7	β-8	β-9	High-β
Panel A: Average Monthly Returns (in Percent)											
All	1.25	1.34	1.29	1.36	1.31	1.33	1.28	1.24	1.21	1.25	1.14
Small-ME	1.52	1.71	1.57	1.79	1.61	1.50	1.50	1.37	1.63	1.50	1.42
ME-2	1.29	1.25	1.42	1.36	1.39	1.65	1.61	1.37	1.31	1.34	1.11
ME-3	1.24	1.12	1.31	1.17	1.70	1.29	1.10	1.31	1.36	1.26	0.76
ME-4	1.25	1.27	1.13	1.54	1.06	1.34	1.06	1.41	1.17	1.35	0.98
ME-5	1.29	1.34	1.42	1.39	1.48	1.42	1.18	1.13	1.27	1.18	1.08
ME-6	1.17	1.08	1.53	1.27	1.15	1.20	1.21	1.18	1.04	1.07	1.02
ME-7	1.07	0.95	1.21	1.26	1.09	1.18	1.11	1.24	0.62	1.32	0.76
ME-8	1.10	1.09	1.05	1.37	1.20	1.27	0.98	1.18	1.02	1.01	0.94
ME-9	0.95	0.98	0.88	1.02	1.14	1.07	1.23	0.94	0.82	0.88	0.59
Large-ME	0.89	1.01	0.93	1.10	0.94	0.93	0.89	1.03	0.71	0.74	0.56

Table I—*Continued*

	All	Low-β	β-2	β-3	β-4	β-5	β-6	β-7	β-8	β-9	High-β
					Panel B: Post-Ranking βs						
All		0.87	0.99	1.09	1.16	1.26	1.29	1.35	1.45	1.52	1.72
Small-ME	1.44	1.05	1.18	1.28	1.32	1.40	1.40	1.49	1.61	1.64	1.79
ME-2	1.39	0.91	1.15	1.17	1.24	1.36	1.41	1.43	1.50	1.66	1.76
ME-3	1.35	0.97	1.13	1.13	1.21	1.26	1.28	1.39	1.50	1.51	1.75
ME-4	1.34	0.78	1.03	1.17	1.16	1.29	1.37	1.46	1.51	1.64	1.71
ME-5	1.25	0.66	0.85	1.12	1.15	1.16	1.26	1.30	1.43	1.59	1.68
ME-6	1.23	0.61	0.78	1.05	1.16	1.22	1.28	1.36	1.46	1.49	1.70
ME-7	1.17	0.57	0.92	1.01	1.11	1.14	1.26	1.24	1.39	1.34	1.60
ME-8	1.09	0.53	0.74	0.94	1.02	1.13	1.12	1.18	1.26	1.35	1.52
ME-9	1.03	0.58	0.74	0.80	0.95	1.06	1.15	1.14	1.21	1.22	1.42
Large-ME	0.92	0.57	0.71	0.78	0.89	0.95	0.92	1.02	1.01	1.11	1.32
					Panel C: Average Size (ln(ME))						
All	4.11	3.86	4.26	4.33	4.41	4.27	4.32	4.26	4.19	4.03	3.77
Small-ME	2.24	2.12	2.27	2.30	2.30	2.28	2.29	2.30	2.32	2.25	2.15
ME-2	3.63	3.65	3.68	3.70	3.72	3.69	3.70	3.69	3.69	3.70	3.68
ME-3	4.10	4.14	4.18	4.12	4.15	4.16	4.16	4.18	4.14	4.15	4.15
ME-4	4.50	4.53	4.53	4.57	4.54	4.56	4.55	4.52	4.58	4.52	4.56
ME-5	4.89	4.91	4.91	4.93	4.95	4.93	4.92	4.93	4.92	4.92	4.95
ME-6	5.30	5.30	5.33	5.34	5.34	5.33	5.33	5.33	5.33	5.34	5.36
ME-7	5.73	5.73	5.75	5.77	5.76	5.73	5.77	5.77	5.76	5.72	5.76
ME-8	6.24	6.26	6.27	6.26	6.24	6.24	6.27	6.24	6.24	6.24	6.26
ME-9	6.82	6.82	6.84	6.82	6.82	6.81	6.81	6.81	6.81	6.80	6.83
Large-ME	7.93	7.94	8.04	8.10	8.04	8.02	8.02	7.94	7.80	7.75	7.62

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 10 of 40

Table II

Properties of Portfolios Formed on Size or Pre-Ranking β: July 1963 to December 1990

At the end of June of each year t, 12 portfolios are formed on the basis of ranked values of size (ME) or pre-ranking β. The pre-ranking βs use 2 to 5 years (as available) of monthly returns ending in June of t. Portfolios 2–9 cover deciles of the ranking variables. The bottom and top 2 portfolios (1A, 1B, 10A, and 10B) split the bottom and top deciles in half. The breakpoints for the ME portfolios are based on ranked values of ME for all NYSE stocks on CRSP. NYSE breakpoints for pre-ranking βs are also used to form the β portfolios. NYSE, AMEX, and NASDAQ stocks are then allocated to the size or β portfolios using the NYSE breakpoints. We calculate each portfolio's monthly equal-weighted return for July of year t to June of year $t + 1$, and then reform the portfolios in June of $t + 1$.

BE is the book value of common equity plus balance-sheet deferred taxes, A is total book assets, and E is earnings (income before extraordinary items, plus income-statement deferred taxes, minus preferred dividends). BE, A, and E are for each firm's latest fiscal year ending in calendar year $t - 1$. The accounting ratios are measured using market equity ME in December of year $t - 1$. Firm size ln(ME) is measured in June of year t, with ME denominated in millions of dollars.

The average return is the time-series average of the monthly equal-weighted portfolio returns, in percent. ln(ME), ln(BE/ME), ln(A/ME), ln(A/BE), E/P, and E/P dummy are the time-series averages of the monthly average values of these variables in each portfolio. Since the E/P dummy is 0 when earnings are positive, and 1 when earnings are negative, E/P dummy gives the average proportion of stocks with negative earnings in each portfolio.

β is the time-series average of the monthly portfolio βs. Stocks are assigned the post-ranking β of the size-β portfolio they are in at the end of June of year t (Table I). These individual-firm βs are averaged to compute the monthly βs for each portfolio for July of year t to June of year $t + 1$.

Firms is the average number of stocks in the portfolio each month.

	1A	1B	2	3	4	5	6	7	8	9	10A	10B
Panel A: Portfolios Formed on Size												
Return	1.64	1.16	1.29	1.24	1.25	1.29	1.17	1.07	1.10	0.95	0.88	0.90
β	1.44	1.44	1.39	1.34	1.33	1.24	1.22	1.16	1.08	1.02	0.95	0.90
ln(ME)	1.98	3.18	3.63	4.10	4.50	4.89	5.30	5.73	6.24	6.82	7.39	8.44
ln(BE/ME)	−0.01	−0.21	−0.23	−0.26	−0.32	−0.36	−0.36	−0.44	−0.40	−0.42	−0.51	−0.65
ln(A/ME)	0.73	0.50	0.46	0.43	0.37	0.32	0.32	0.24	0.29	0.27	0.17	−0.03
ln(A/BE)	0.75	0.71	0.69	0.69	0.68	0.67	0.68	0.67	0.69	0.70	0.68	0.62
E/P dummy	0.26	0.14	0.11	0.09	0.06	0.04	0.04	0.03	0.03	0.02	0.02	0.01
E(+)/P	0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.09	0.09
Firms	772	189	236	170	144	140	128	125	119	114	60	64

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 11 of 40

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 12 of 40

Table II—*Continued*

	1A	1B	2	3	4	5	6	7	8	9	10A	10B
Panel B: Portfolios Formed on Pre-Ranking β												
Return	1.20	1.20	1.32	1.26	1.31	1.30	1.30	1.23	1.23	1.33	1.34	1.18
β	0.81	0.79	0.92	1.04	1.13	1.19	1.26	1.32	1.41	1.52	1.63	1.73
ln(ME)	4.21	4.86	4.75	4.68	4.59	4.48	4.36	4.25	3.97	3.78	3.52	3.15
ln(BE/ME)	−0.18	−0.13	−0.22	−0.21	−0.23	−0.22	−0.22	−0.25	−0.23	−0.27	−0.31	−0.50
ln(A/ME)	0.60	0.66	0.49	0.45	0.42	0.42	0.45	0.42	0.47	0.46	0.46	0.31
ln(A/BE)	0.78	0.79	0.71	0.66	0.64	0.65	0.67	0.67	0.70	0.73	0.77	0.81
E/P dummy	0.12	0.06	0.09	0.09	0.08	0.09	0.10	0.12	0.12	0.14	0.17	0.23
E(+)/P	0.11	0.12	0.10	0.10	0.10	0.10	0.10	0.09	0.10	0.09	0.09	0.08
Firms	116	80	185	181	179	182	185	205	227	267	165	291

for variation in β that is unrelated to size, the relation between β and average return is flat, even when β is the only explanatory variable.

B. Fama-MacBeth Regressions

Table III shows time-series averages of the slopes from the month-by-month Fama-MacBeth (FM) regressions of the cross-section of stock returns on size, β, and the other variables (leverage, E/P, and book-to-market equity) used to explain average returns. The average slopes provide standard FM tests for determining which explanatory variables on average have non-zero expected premiums during the July 1963 to December 1990 period.

Like the average returns in Tables I and II, the regressions in Table III say that size, ln(ME), helps explain the cross-section of average stock returns. The average slope from the monthly regressions of returns on size alone is -0.15%, with a t-statistic of -2.58. This reliable negative relation persists no matter which other explanatory variables are in the regressions; the average slopes on ln(ME) are always close to or more than 2 standard errors from 0. The size effect (smaller stocks have higher average returns) is thus robust in the 1963–1990 returns on NYSE, AMEX, and NASDAQ stocks.

In contrast to the consistent explanatory power of size, the FM regressions show that market β does not help explain average stock returns for 1963–1990. In a shot straight at the heart of the SLB model, the average slope from the regressions of returns on β alone in Table III is 0.15% per month and only 0.46 standard errors from 0. In the regressions of returns on size and β, size has explanatory power (an average slope -3.41 standard errors from 0), but the average slope for β is negative and only 1.21 standard errors from 0. Lakonishok and Shapiro (1986) get similar results for NYSE stocks for 1962–1981. We can also report that β shows no power to explain average returns (the average slopes are typically less than 1 standard error from 0) in FM regressions that use various combinations of β with size, book-to-market equity, leverage, and E/P.

C. Can β Be Saved?

What explains the poor results for β? One possibility is that other explanatory variables are correlated with true βs, and this obscures the relation between average returns and measured βs. But this line of attack cannot explain why β has no power when used alone to explain average returns. Moreover, leverage, book-to-market equity, and E/P do not seem to be good proxies for β. The averages of the monthly cross-sectional correlations between β and the values of these variables for individual stocks are all within 0.15 of 0.

Another hypothesis is that, as predicted by the SLB model, there is a positive relation between β and average return, but the relation is obscured by noise in the β estimates. However, our full-period post-ranking βs do not seem to be imprecise. Most of the standard errors of the βs (not shown) are

Table III

Average Slopes (t-Statistics) from Month-by-Month Regressions of Stock Returns on β, Size, Book-to-Market Equity, Leverage, and E/P: July 1963 to December 1990

Stocks are assigned the post-ranking β of the size-β portfolio they are in at the end of June of year t (Table I). BE is the book value of common equity plus balance-sheet deferred taxes, A is total book assets, and E is earnings (income before extraordinary items, plus income-statement deferred taxes, minus preferred dividends). BE, A, and E are for each firm's latest fiscal year ending in calendar year $t-1$. The accounting ratios are measured using market equity ME in December of year $t-1$. Firm size ln(ME) is measured in June of year t. In the regressions, these values of the explanatory variables for individual stocks are matched with CRSP returns for the months from July of year t to June of year $t+1$. The gap between the accounting data and the returns ensures that the accounting data are available prior to the returns. If earnings are positive, E(+)/P is the ratio of total earnings to market equity and E/P dummy is 0. If earnings are negative, E(+)/P is 0 and E/P dummy is 1.

The average slope is the time-series average of the monthly regression slopes for July 1963 to December 1990, and the t-statistic is the average slope divided by its time-series standard error.

On average, there are 2267 stocks in the monthly regressions. To avoid giving extreme observations heavy weight in the regressions, the smallest and largest 0.5% of the observations on E(+)/P, BE/ME, A/ME, and A/BE are set equal to the next largest or smallest values of the ratios (the 0.005 and 0.995 fractiles). This has no effect on inferences.

β	ln(ME)	ln(BE/ME)	ln(A/ME)	ln(A/BE)	E/P Dummy	E(+)/P
0.15						
(0.46)						
	−0.15					
	(−2.58)					
−0.37	−0.17					
(−1.21)	(−3.41)					
		0.50				
		(5.71)				
			0.50	−0.57		
			(5.69)	(−5.34)		
					0.57	4.72
					(2.28)	(4.57)
	−0.11	0.35				
	(−1.99)	(4.44)				
	−0.11		0.35	−0.50		
	(−2.06)		(4.32)	(−4.56)		
	−0.16				0.06	2.99
	(−3.06)				(0.38)	(3.04)
	−0.13	0.33			−0.14	0.87
	(−2.47)	(4.46)			(−0.90)	(1.23)
	−0.13		0.32	−0.46	−0.08	1.15
	(−2.47)		(4.28)	(−4.45)	(−0.56)	(1.57)

0.05 or less, only 1 is greater than 0.1, and the standard errors are small relative to the range of the βs (0.53 to 1.79).

The β-sorted portfolios in Tables I and II also provide strong evidence against the β-measurement-error story. When portfolios are formed on pre-ranking βs alone (Table II), the post-ranking βs for the portfolios almost perfectly reproduce the ordering of the pre-ranking βs. Only the β for portfolio 1B is out of line, and only by 0.02. Similarly, when portfolios are formed on size and then pre-ranking βs (Table I), the post-ranking βs in each size decile closely reproduce the ordering of the pre-ranking βs.

The correspondence between the ordering of the pre-ranking and post-ranking βs for the β-sorted portfolios in Tables I and II is evidence that the post-ranking βs are informative about the ordering of the true βs. The problem for the SLB model is that there is no similar ordering in the average returns on the β-sorted portfolios. Whether one looks at portfolios sorted on β alone (Table II) or on size and then β (Table I), average returns are flat (Table II) or decline slightly (Table I) as the post-ranking βs increase.

Our evidence on the robustness of the size effect and the absence of a relation between β and average return is so contrary to the SLB model that it behooves us to examine whether the results are special to 1963–1990. The appendix shows that NYSE returns for 1941–1990 behave like the NYSE, AMEX, and NASDAQ returns for 1963–1990; there is a reliable size effect over the full 50-year period, but little relation between β and average return. Interestingly, there is a reliable simple relation between β and average return during the 1941–1965 period. These 25 years are a major part of the samples in the early studies of the SLB model of Black, Jensen, and Scholes (1972) and Fama and MacBeth (1973). Even for the 1941–1965 period, however, the relation between β and average return disappears when we control for size.

III. Book-to-Market Equity, E/P, and Leverage

Tables I to III say that there is a strong relation between the average returns on stocks and size, but there is no reliable relation between average returns and β. In this section we show that there is also a strong cross-sectional relation between average returns and book-to-market equity. If anything, this book-to-market effect is more powerful than the size effect. We also find that the combination of size and book-to-market equity absorbs the apparent roles of leverage and E/P in average stock returns.

A. Average Returns

Table IV shows average returns for July 1963 to December 1990 for portfolios formed on ranked values of book-to-market equity (BE/ME) or earnings-price ratio (E/P). The BE/ME and E/P portfolios in Table IV are formed in the same general way (one-dimensional yearly sorts) as the size and β portfolios in Table II. (See the tables for details.)

The relation between average return and E/P has a familiar U-shape (e.g., Jaffe, Keim, and Westerfield (1989) for U.S. data, and Chan, Hamao, and Lakonishok (1991) for Japan). Average returns decline from 1.46% per month for the negative E/P portfolio to 0.93% for the firms in portfolio 1B that have low but positive E/P. Average returns then increase monotonically, reaching 1.72% per month for the highest E/P portfolio.

The more striking evidence in Table IV is the strong positive relation between average return and book-to-market equity. Average returns rise from 0.30% for the lowest BE/ME portfolio to 1.83% for the highest, a difference of 1.53% per month. This spread is twice as large as the difference of 0.74% between the average monthly returns on the smallest and largest size portfolios in Table II. Note also that the strong relation between book-to-market equity and average return is unlikely to be a β effect in disguise; Table IV shows that post-ranking market βs vary little across portfolios formed on ranked values of BE/ME.

On average, only about 50 (out of 2317) firms per year have negative book equity, BE. The negative BE firms are mostly concentrated in the last 14 years of the sample, 1976–1989, and we do not include them in the tests. We can report, however, that average returns for negative BE firms are high, like the average returns of high BE/ME firms. Negative BE (which results from persistently negative earnings) and high BE/ME (which typically means that stock prices have fallen) are both signals of poor earning prospects. The similar average returns of negative and high BE/ME firms are thus consistent with the hypothesis that book-to-market equity captures cross-sectional variation in average returns that is related to relative distress.

B. Fama-MacBeth Regressions

B.1. BE/ME

The FM regressions in Table III confirm the importance of book-to-market equity in explaining the cross-section of average stock returns. The average slope from the monthly regressions of returns on ln(BE/ME) alone is 0.50%, with a t-statistic of 5.71. This book-to-market relation is stronger than the size effect, which produces a t-statistic of -2.58 in the regressions of returns on ln(ME) alone. But book-to-market equity does not replace size in explaining average returns. When both ln(ME) and ln(BE/ME) are included in the regressions, the average size slope is still -1.99 standard errors from 0; the book-to-market slope is an impressive 4.44 standard errors from 0.

B.2. Leverage

The FM regressions that explain returns with leverage variables provide interesting insight into the relation between book-to-market equity and average return. We use two leverage variables, the ratio of book assets to market equity, A/ME, and the ratio of book assets to book equity, A/BE. We interpret A/ME as a measure of market leverage, while A/BE is a measure

Table IV

Properties of Portfolios Formed on Book-to-Market Equity (BE/ME) and Earnings-Price Ratio (E/P): July 1963 to December 1990

At the end of each year $t-1$, 12 portfolios are formed on the basis of ranked values of BE/ME or E/P. Portfolios 2–9 cover deciles of the ranking variables. The bottom and top 2 portfolios (1A, 1B, 10A, and 10B) split the bottom and top deciles in half. For E/P, there are 13 portfolios; portfolio 0 is stocks with negative E/P. Since BE/ME and E/P are not strongly related to exchange listing, their portfolio breakpoints are determined on the basis of the ranked values of the variables for all stocks that satisfy the CRSP-COMPUSTAT data requirements. BE is the book value of common equity plus balance-sheet deferred taxes, A is total book assets, and E is earnings (income before extraordinary items, plus income-statement deferred taxes, minus preferred dividends). BE, A, and E are for each firm's latest fiscal year ending in calendar year $t-1$. The accounting ratios are measured using market equity ME in December of year $t-1$. Firm size ln(ME) is measured in June of year t, with ME denominated in millions of dollars. We calculate each portfolio's monthly equal-weighted return for July of year t to June of year $t+1$, and then reform the portfolios at the end of year t.

Return is the time-series average of the monthly equal-weighted portfolio returns (in percent). ln(ME), ln(BE/ME), ln(A/ME), ln(A/BE), E(+)/P, and E/P dummy are the time-series averages of the monthly average values of these variables in each portfolio. Since the E/P dummy is 0 when earnings are positive, and 1 when earnings are negative, E/P dummy gives the average proportion of stocks with negative earnings in each portfolio.

β is the time-series average of the monthly portfolio βs. Stocks are assigned the post-ranking β of the size-β portfolio they are in at the end of June of year t (Table I). These individual-firm βs are averaged to compute the monthly βs for each portfolio for July of year t to June of year $t+1$.

Firms is the average number of stocks in the portfolio each month.

Portfolio	0	1A	1B	2	3	4	5	6	7	8	9	10A	10B
Panel A: Stocks Sorted on Book-to-Market Equity (BE/ME)													
Return		0.30	0.67	0.87	0.97	1.04	1.17	1.30	1.44	1.50	1.59	1.92	1.83
β		1.36	1.34	1.32	1.30	1.28	1.27	1.27	1.27	1.27	1.29	1.33	1.35
ln(ME)		4.53	4.67	4.69	4.56	4.47	4.38	4.23	4.06	3.85	3.51	3.06	2.65
ln(BE/ME)		−2.22	−1.51	−1.09	−0.75	−0.51	−0.32	−0.14	0.03	0.21	0.42	0.66	1.02
ln(A/ME)		−1.24	−0.79	−0.40	−0.05	0.20	0.40	0.56	0.71	0.91	1.12	1.35	1.75
ln(A/BE)		0.94	0.71	0.68	0.70	0.71	0.71	0.70	0.68	0.70	0.70	0.70	0.73
E/P dummy		0.29	0.15	0.10	0.08	0.08	0.08	0.09	0.09	0.11	0.15	0.22	0.36
E(+)/P		0.03	0.04	0.06	0.08	0.09	0.10	0.11	0.11	0.12	0.12	0.11	0.10
Firms		89	98	209	222	226	230	235	237	239	239	120	117

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 17 of 40

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 18 of 40

Table IV—*Continued*

Portfolio	0	1A	1B	2	3	4	5	6	7	8	9	10A	10B
Panel B: Stocks Sorted on Earnings-Price Ratio (E/P)													
Return	1.46	1.04	0.93	0.94	1.03	1.18	1.22	1.33	1.42	1.46	1.57	1.74	1.72
β	1.47	1.40	1.35	1.31	1.28	1.26	1.25	1.26	1.24	1.23	1.24	1.28	1.31
ln(ME)	2.48	3.64	4.33	4.61	4.64	4.63	4.58	4.49	4.37	4.28	4.07	3.82	3.52
ln(BE/ME)	−0.10	−0.76	−0.91	−0.79	−0.61	−0.47	−0.33	−0.21	−0.08	0.02	0.15	0.26	0.40
ln(A/ME)	0.90	−0.05	−0.27	−0.16	0.03	0.18	0.31	0.44	0.58	0.70	0.85	1.01	1.25
ln(A/BE)	0.99	0.70	0.63	0.63	0.64	0.65	0.64	0.65	0.66	0.68	0.71	0.75	0.86
E/P dummy	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
E(+)/P	0.00	0.01	0.03	0.05	0.06	0.08	0.09	0.11	0.12	0.14	0.16	0.20	0.28
Firms	355	88	90	182	190	193	196	194	197	195	195	95	91

of book leverage. The regressions use the natural logs of the leverage ratios, ln(A/ME) and ln(A/BE), because preliminary tests indicated that logs are a good functional form for capturing leverage effects in average returns. Using logs also leads to a simple interpretation of the relation between the roles of leverage and book-to-market equity in average returns.

The FM regressions of returns on the leverage variables (Table III) pose a bit of a puzzle. The two leverage variables are related to average returns, but with opposite signs. As in Bhandari (1988), higher market leverage is associated with higher average returns; the average slopes for ln(A/ME) are always positive and more than 4 standard errors from 0. But higher book leverage is associated with lower average returns; the average slopes for ln(A/BE) are always negative and more than 4 standard errors from 0.

The puzzle of the opposite slopes on ln(A/ME) and ln(A/BE) has a simple solution. The average slopes for the two leverage variables are opposite in sign but close in absolute value, e.g., 0.50 and −0.57. Thus it is the difference between market and book leverage that helps explain average returns. But the difference between market and book leverage is book-to-market equity, ln(BE/ME) = ln(A/ME) − ln(A/BE). Table III shows that the average book-to-market slopes in the FM regressions are indeed close in absolute value to the slopes for the two leverage variables.

The close links between the leverage and book-to-market results suggest that there are two equivalent ways to interpret the book-to-market effect in average returns. A high ratio of book equity to market equity (a low stock price relative to book value) says that the market judges the prospects of a firm to be poor relative to firms with low BE/ME. Thus BE/ME may capture the relative-distress effect postulated by Chan and Chen (1991). A high book-to-market ratio also says that a firm's market leverage is high relative to its book leverage; the firm has a large amount of market-imposed leverage because the market judges that its prospects are poor and discounts its stock price relative to book value. In short, our tests suggest that the relative-distress effect, captured by BE/ME, can also be interpreted as an involuntary leverage effect, which is captured by the difference between A/ME and A/BE.

B.3. E/P

Ball (1978) posits that the earnings-price ratio is a catch-all for omitted risk factors in expected returns. If current earnings proxy for expected future earnings, high-risk stocks with high expected returns will have low prices relative to their earnings. Thus, E/P should be related to expected returns, whatever the omitted sources of risk. This argument only makes sense, however, for firms with positive earnings. When current earnings are negative, they are not a proxy for the earnings forecasts embedded in the stock price, and E/P is not a proxy for expected returns. Thus, the slope for E/P in the FM regressions is based on positive values; we use a dummy variable for E/P when earnings are negative.

The U-shaped relation between average return and E/P observed in Table IV is also apparent when the E/P variables are used alone in the FM regressions in Table III. The average slope on the E/P dummy variable (0.57% per month, 2.28 standard errors from 0) confirms that firms with negative earnings have higher average returns. The average slope for stocks with positive E/P (4.72% per month, 4.57 standard errors from 0) shows that average returns increase with E/P when it is positive.

Adding size to the regressions kills the explanatory power of the E/P dummy. Thus the high average returns of negative E/P stocks are better captured by their size, which Table IV says is on average small. Adding both size and book-to-market equity to the E/P regressions kills the E/P dummy and lowers the average slope on E/P from 4.72 to 0.87 (t = 1.23). In contrast, the average slopes for ln(ME) and ln(BE/ME) in the regressions that include E/P are similar to those in the regressions that explain average returns with only size and book-to-market equity. The results suggest that most of the relation between (positive) E/P and average return is due to the positive correlation between E/P and ln(BE/ME), illustrated in Table IV; firms with high E/P tend to have high book-to-market equity ratios.

IV. A Parsimonious Model for Average Returns

The results to here are easily summarized:

(1) When we allow for variation in β that is unrelated to size, there is no reliable relation between β and average return.
(2) The opposite roles of market leverage and book leverage in average returns are captured well by book-to-market equity.
(3) The relation between E/P and average return seems to be absorbed by the combination of size and book-to-market equity.

In a nutshell, market β seems to have no role in explaining the average returns on NYSE, AMEX, and NASDAQ stocks for 1963–1990, while size and book-to-market equity capture the cross-sectional variation in average stock returns that is related to leverage and E/P.

A. Average Returns, Size and Book-to-Market Equity

The average return matrix in Table V gives a simple picture of the two-dimensional variation in average returns that results when the 10 size deciles are each subdivided into 10 portfolios based on ranked values of BE/ME for individual stocks. Within a size decile (across a row of the average return matrix), returns typically increase strongly with BE/ME: on average, the returns on the lowest and highest BE/ME portfolios in a size decile differ by 0.99% (1.63% − 0.64%) per month. Similarly, looking down the columns of the average return matrix shows that there is a negative relation between average return and size: on average, the spread of returns across the size portfolios in a BE/ME group is 0.58% per month. The average return matrix gives life to the conclusion from the regressions that,

Table V

Average Monthly Returns on Portfolios Formed on Size and Book-to-Market Equity; Stocks Sorted by ME (Down) and then BE/ME (Across): July 1963 to December 1990

In June of each year t, the NYSE, AMEX, and NASDAQ stocks that meet the CRSP-COMPUSTAT data requirements are allocated to 10 size portfolios using the NYSE size (ME) breakpoints. The NYSE, AMEX, and NASDAQ stocks in each size decile are then sorted into 10 BE/ME portfolios using the book-to-market ratios for year $t-1$. BE/ME is the book value of common equity plus balance-sheet deferred taxes for fiscal year $t-1$, over market equity for December of year $t-1$. The equal-weighted monthly portfolio returns are then calculated for July of year t to June of year $t+1$.

Average monthly return is the time-series average of the monthly equal-weighted portfolio returns (in percent).

The All column shows average returns for equal-weighted size decile portfolios. The All row shows average returns for equal-weighted portfolios of the stocks in each BE/ME group.

	Book-to-Market Portfolios										
	All	Low	2	3	4	5	6	7	8	9	High
All	1.23	0.64	0.98	1.06	1.17	1.24	1.26	1.39	1.40	1.50	1.63
Small-ME	1.47	0.70	1.14	1.20	1.43	1.56	1.51	1.70	1.71	1.82	1.92
ME-2	1.22	0.43	1.05	0.96	1.19	1.33	1.19	1.58	1.28	1.43	1.79
ME-3	1.22	0.56	0.88	1.23	0.95	1.36	1.30	1.30	1.40	1.54	1.60
ME-4	1.19	0.39	0.72	1.06	1.36	1.13	1.21	1.34	1.59	1.51	1.47
ME-5	1.24	0.88	0.65	1.08	1.47	1.13	1.43	1.44	1.26	1.52	1.49
ME-6	1.15	0.70	0.98	1.14	1.23	0.94	1.27	1.19	1.19	1.24	1.50
ME-7	1.07	0.95	1.00	0.99	0.83	0.99	1.13	0.99	1.16	1.10	1.47
ME-8	1.08	0.66	1.13	0.91	0.95	0.99	1.01	1.15	1.05	1.29	1.55
ME-9	0.95	0.44	0.89	0.92	1.00	1.05	0.93	0.82	1.11	1.04	1.22
Large-ME	0.89	0.93	0.88	0.84	0.71	0.79	0.83	0.81	0.96	0.97	1.18

controlling for size, book-to-market equity captures strong variation in average returns, and controlling for book-to-market equity leaves a size effect in average returns.

B. The Interaction between Size and Book-to-Market Equity

The average of the monthly correlations between the cross-sections of ln(ME) and ln(BE/ME) for individual stocks is -0.26. The negative correlation is also apparent in the average values of ln(ME) and ln(BE/ME) for the portfolios sorted on ME or BE/ME in Tables II and IV. Thus, firms with low market equity are more likely to have poor prospects, resulting in low stock prices and high book-to-market equity. Conversely, large stocks are more likely to be firms with stronger prospects, higher stock prices, lower book-to-market equity, and lower average stock returns.

The correlation between size and book-to-market equity affects the regressions in Table III. Including ln(BE/ME) moves the average slope on ln(ME) from -0.15 ($t = -2.58$) in the univariate regressions to -0.11 ($t = -1.99$) in the bivariate regressions. Similarly, including ln(ME) in the regressions lowers the average slope on ln(BE/ME) from 0.50 to 0.35 (still a healthy 4.44 standard errors from 0). Thus, part of the size effect in the simple regressions is due to the fact that small ME stocks are more likely to have high book-to-market ratios, and part of the simple book-to-market effect is due to the fact that high BE/ME stocks tend to be small (they have low ME).

We should not, however, exaggerate the links between size and book-to-market equity. The correlation (-0.26) between ln(ME) and ln(BE/ME) is not extreme, and the average slopes in the bivariate regressions in Table III show that ln(ME) and ln(BE/ME) are both needed to explain the cross-section of average returns. Finally, the 10×10 average return matrix in Table V provides concrete evidence that, (a) controlling for size, book-to-market equity captures substantial variation in the cross-section of average returns, and (b) within BE/ME groups average returns are related to size.

C. Subperiod Averages of the FM Slopes

The message from the average FM slopes for 1963–1990 (Table III) is that size on average has a negative premium in the cross-section of stock returns, book-to-market equity has a positive premium, and the average premium for market β is essentially 0. Table VI shows the average FM slopes for two roughly equal subperiods (July 1963–December 1976 and January 1977–December 1990) from two regressions: (a) the cross-section of stock returns on size, ln(ME), and book-to-market equity, ln(BE/ME), and (b) returns on β, ln(ME), and ln(BE/ME). For perspective, average returns on the value-weighted and equal-weighted (VW and EW) portfolios of NYSE stocks are also shown.

In FM regressions, the intercept is the return on a standard portfolio (the weights on stocks sum to 1) in which the weighted averages of the explanatory variables are 0 (Fama (1976), chapter 9). In our tests, the intercept is weighted toward small stocks (ME is in millions of dollars so ln(ME) = 0 implies ME = \$1 million) and toward stocks with relatively high book-to-market ratios (Table IV says that ln(BE/ME) is negative for the typical firm, so ln(BE/ME) = 0 is toward the high end of the sample ratios). Thus it is not surprising that the average intercepts are always large relative to their standard errors and relative to the returns on the NYSE VW and EW portfolios.

Like the overall period, the subperiods do not offer much hope that the average premium for β is economically important. The average FM slope for β is only slightly positive for 1963–1976 (0.10% per month, $t = 0.25$), and it is negative for 1977–1990 (-0.44% per month, $t = -1.17$). There is a hint that the size effect is weaker in the 1977–1990 period, but inferences about the average size slopes for the subperiods lack power.

Unlike the size effect, the relation between book-to-market equity and average return is so strong that it shows up reliably in both the 1963–1976 and the 1977–1990 subperiods. The average slopes for ln(BE/ME) are all more than 2.95 standard errors from 0, and the average slopes for the

Table VI

Subperiod Average Monthly Returns on the NYSE Equal-Weighted and Value-Weighted Portfolios and Subperiod Means of the Intercepts and Slopes from the Monthly FM Cross-Sectional Regressions of Returns on (a) Size (ln(ME)) and Book-to-Market Equity (ln(BE/ME)), and (b) β, ln(ME), and ln(BE/ME)

Mean is the time-series mean of a monthly return, Std is its time-series standard deviation, and t(Mn) is Mean divided by its time-series standard error.

	7/63–12/90 (330 Mos.)			7/63–12/76 (162 Mos.)			1/77–12/90 (168 Mos.)		
Variable	Mean	Std	t(Mn)	Mean	Std	t(Mn)	Mean	Std	t(Mn)
	NYSE Value-Weighted (VW) and Equal-Weighted (EW) Portfolio Returns								
VW	0.81	4.47	3.27	0.56	4.26	1.67	1.04	4.66	2.89
EW	0.97	5.49	3.19	0.77	5.70	1.72	1.15	5.28	2.82
	$R_{it} = a + b_{2t}\ln(ME_{it}) + b_{3t}\ln(BE/ME_{it}) + e_{it}$								
a	1.77	8.51	3.77	1.86	10.10	2.33	1.69	6.67	3.27
b_2	−0.11	1.02	−1.99	−0.16	1.25	−1.62	−0.07	0.73	−1.16
b_3	0.35	1.45	4.43	0.36	1.53	2.96	0.35	1.37	3.30
	$R_{it} = a + b_{1t}\beta_{it} + b_{2t}\ln(ME_{it}) + b_{3t}\ln(BE/ME_{it}) + e_{it}$								
a	2.07	5.75	6.55	1.73	6.22	3.54	2.40	5.25	5.92
b_1	−0.17	5.12	−0.62	0.10	5.33	0.25	−0.44	4.91	−1.17
b_2	−0.12	0.89	−2.52	−0.15	1.03	−1.91	−0.09	0.74	−1.64
b_3	0.33	1.24	4.80	0.34	1.36	3.17	0.31	1.10	3.67

subperiods (0.36 and 0.35) are close to the average slope (0.35) for the overall period. The subperiod results thus support the conclusion that, among the variables considered here, book-to-market equity is consistently the most powerful for explaining the cross-section of average stock returns.

Finally, Roll (1983) and Keim (1983) show that the size effect is stronger in January. We have examined the monthly slopes from the FM regressions in Table VI for evidence of a January seasonal in the relation between book-to-market equity and average return. The average January slopes for ln(BE/ME) are about twice those for February to December. Unlike the size effect, however, the strong relation between book-to-market equity and average return is not special to January. The average monthly February-to-December slopes for ln(BE/ME) are about 4 standard errors from 0, and they are close to (within 0.05 of) the average slopes for the whole year. Thus, there is a January seasonal in the book-to-market equity effect, but the positive relation between BE/ME and average return is strong throughout the year.

D. β and the Market Factor: Caveats

Some caveats about the negative evidence on the role of β in average returns are in order. The average premiums for β, size, and book-to-market equity depend on the definitions of the variables used in the regressions. For example, suppose we replace book-to-market equity (ln(BE/ME)) with book equity (ln(BE)). As long as size (ln(ME)) is also in the regression, this change will not affect the intercept, the fitted values or the R^2. But the change, in variables increases the average slope (and the *t*-statistic) on ln(ME). In other words, it increases the risk premium associated with size. Other redefinitions of the β, size, and book-to-market variables will produce different regression slopes and perhaps different inferences about average premiums, including possible resuscitation of a role for β. And, of course, at the moment, we have no theoretical basis for choosing among different versions of the variables.

Moreover, the tests here are restricted to stocks. It is possible that including other assets will change the inferences about the average premiums for β, size, and book-to-market equity. For example, the large average intercepts for the FM regressions in Table VI suggest that the regressions will not do a good job on Treasury bills, which have low average returns and are likely to have small loadings on the underlying market, size, and book-to-market factors in returns. Extending the tests to bills and other bonds may well change our inferences about average risk premiums, including the revival of a role for market β.

We emphasize, however, that different approaches to the tests are not likely to revive the Sharpe-Lintner-Black model. Resuscitation of the SLB model requires that a better proxy for the market portfolio (a) overturns our evidence that the simple relation between β and average stock returns is flat and (b) leaves β as the only variable relevant for explaining average returns. Such results seem unlikely, given Stambaugh's (1982) evidence that tests of the SLB model do not seem to be sensitive to the choice of a market proxy. Thus, if there is a role for β in average returns, it is likely to be found in a multi-factor model that transforms the flat simple relation between average return and β into a positively sloped conditional relation.

V. Conclusions and Implications

The Sharpe-Lintner-Black model has long shaped the way academics and practitioners think about average return and risk. Black, Jensen, and Scholes (1972) and Fama and MacBeth (1973) find that, as predicted by the model, there is a positive simple relation between average return and market β during the early years (1926–1968) of the CRSP NYSE returns file. Like Reinganum (1981) and Lakonishok and Shapiro (1986), we find that this simple relation between β and average return disappears during the more recent 1963–1990 period. The appendix that follows shows that the relation between β and average return is also weak in the last half century (1941–1990) of returns on NYSE stocks. In short, our tests do not support the central prediction of the SLB model, that average stock returns are positively related to market β.

Banz (1981) documents a strong negative relation between average return and firm size. Bhandari (1988) finds that average return is positively related to leverage, and Basu (1983) finds a positive relation between average return and E/P. Stattman (1980) and Rosenberg, Reid, and Lanstein (1985) document a positive relation between average return and book-to-market equity for U.S. stocks, and Chan, Hamao, and Lakonishok (1992) find that BE/ME is also a powerful variable for explaining average returns on Japanese stocks.

Variables like size, E/P, leverage, and book-to-market equity are all scaled versions of a firm's stock price. They can be regarded as different ways of extracting information from stock prices about the cross-section of expected stock returns (Ball (1978); Keim (1988)). Since all these variables are scaled versions of price, it is reasonable to expect that some of them are redundant for explaining average returns. Our main result is that for the 1963–1990 period, size and book-to-market equity capture the cross-sectional variation in average stock returns associated with size, E/P, book-to-market equity, and leverage.

A. Rational Asset-Pricing Stories

Are our results consistent with asset-pricing theory? Since the FM intercept is constrained to be the same for all stocks, FM regressions always impose a linear factor structure on returns and expected returns that is consistent with the multifactor asset-pricing models of Merton (1973) and Ross (1976). Thus our tests impose a rational asset-pricing framework on the relation between average return and size and book-to-market equity.

Even if our results are consistent with asset-pricing theory, they are not economically satisfying. What is the economic explanation for the roles of size and book-to-market equity in average returns? We suggest several paths of inquiry.

(a) The intercepts and slopes in the monthly FM regressions of returns on ln(ME) and ln(BE/ME) are returns on portfolios that mimic the underlying common risk factors in returns proxied by size and book-to-market equity (Fama (1976), chapter 9). Examining the relations between the returns on these portfolios and economic variables that measure variation in business conditions might help expose the nature of the economic risks captured by size and book-to-market equity.

(b) Chan, Chen, and Hsieh (1985) argue that the relation between size and average return proxies for a more fundamental relation between expected returns and economic risk factors. Their most powerful factor in explaining the size effect is the difference between the monthly returns on low- and high-grade corporate bonds, which in principle captures a kind of default risk in returns that is priced. It would be interesting to test whether loadings on this or other economic factors, such as those of Chen, Roll, and Ross (1986), can explain the roles of size and book-to-market equity in our tests.

(c) In a similar vein, Chan and Chen (1991) argue that the relation between size and average return is a relative-prospects effect. The earning prospects of distressed firms are more sensitive to economic conditions. This results in a distress factor in returns that is priced in expected returns. Chan and Chen construct two mimicking portfolios for the distress factor, based on dividend changes and leverage. It would be interesting to check whether loadings on their distress factors absorb the size and book-to-market equity effects in average returns that are documented here.

(d) In fact, if stock prices are rational, BE/ME, the ratio of the book value of a stock to the market's assessment of its value, should be a direct indicator of the relative prospects of firms. For example, we expect that high BE/ME firms have low earnings on assets relative to low BE/ME firms. Our work (in progress) suggests that there is indeed a clean separation between high and low BE/ME firms on various measures of economic fundamentals. Low BE/ME firms are persistently strong performers, while the economic performance of high BE/ME firms is persistently weak.

B. *Irrational Asset-Pricing Stories*

The discussion above assumes that the asset-pricing effects captured by size and book-to-market equity are rational. For BE/ME, our most powerful expected-return variable, there is an obvious alternative. The cross-section of book-to-market ratios might result from market overreaction to the relative prospects of firms. If overreaction tends to be corrected, BE/ME will predict the cross-section of stock returns.

Simple tests do not confirm that the size and book-to-market effects in average returns are due to market overreaction, at least of the type posited by DeBondt and Thaler (1985). One overreaction measure used by DeBondt and Thaler is a stock's most recent 3-year return. Their overreaction story predicts that 3-year losers have strong post-ranking returns relative to 3-year winners. In FM regressions (not shown) for individual stocks, the 3-year lagged return shows no power even when used alone to explain average returns. The univariate average slope for the lagged return is negative, -6 basis points per month, but less than 0.5 standard errors from 0.

C. *Applications*

Our main result is that two easily measured variables, size and book-to-market equity, seem to describe the cross-section of average stock returns. Prescriptions for using this evidence depend on (a) whether it will persist, and (b) whether it results from rational or irrational asset-pricing.

It is possible that, by chance, size and book-to-market equity happen to describe the cross-section of average returns in our sample, but they were and are unrelated to expected returns. We put little weight on this possibility, especially for book-to-market equity. First, although BE/ME has long been touted as a measure of the return prospects of stocks, there is no evidence that its explanatory power deteriorates through time. The 1963–1990 relation between BE/ME and average return is strong, and remarkably similar for the 1963–1976 and 1977–1990 subperiods. Second, our preliminary work on economic fundamentals suggests that high-BE/ME firms tend to be persistently poor earners relative to low-BE/ME firms. Similarly, small firms have a long period of poor earnings during the 1980s not shared with big firms. The systematic patterns in fundamentals give us some hope that size and book-to-market equity proxy for risk factors in returns, related to relative earning prospects, that are rationally priced in expected returns.

If our results are more than chance, they have practical implications for portfolio formation and performance evaluation by investors whose primary concern is long-term average returns. If asset-pricing is rational, size and BE/ME must proxy for risk. Our results then imply that the performance of managed portfolios (e.g., pension funds and mutual funds) can be evaluated by comparing their average returns with the average returns of benchmark portfolios with similar size and BE/ME characteristics. Likewise, the expected returns for different portfolio strategies can be estimated from the historical average returns of portfolios with matching size and BE/ME properties.

If asset-pricing is irrational and size and BE/ME do not proxy for risk, our results might still be used to evaluate portfolio performance and measure the expected returns from alternative investment strategies. If stock prices are irrational, however, the likely persistence of the results is more suspect.

Appendix
Size Versus β: 1941–1990

Our results on the absence of a relation between β and average stock returns for 1963–1990 are so contrary to the tests of the Sharpe-Lintner-Black model by Black, Jensen, and Scholes (1972), Fama and MacBeth (1973), and (more recently) Chan and Chen (1988), that further tests are appropriate. We examine the roles of size and β in the average returns on NYSE stocks for the half-century 1941–1990, the longest available period that avoids the high volatility of returns in the Great Depression. We do not include the accounting variables in the tests because of the strong selection bias (toward successful firms) in the COMPUSTAT data prior to 1962.

We first replicate the results of Chan and Chen (1988). Like them, we find that when portfolios are formed on size alone, there are strong relations between average return and either size or β; average return increases with β and decreases with size. For size portfolios, however, size (ln(ME)) and β are almost perfectly correlated (-0.98), so it is difficult to distinguish between the roles of size and β in average returns.

One way to generate strong variation in β that is unrelated to size is to form portfolios on size and then on β. As in Tables I to III, we find that the resulting independent variation in β just about washes out the positive simple relation between average return and β observed when portfolios are formed on size alone. The results for NYSE stocks for 1941–1990 are thus much like those for NYSE, AMEX, and NASDAQ stocks for 1963–1990.

This appendix also has methodological goals. For example, the FM regressions in Table III use returns on individual stocks as the dependent variable. Since we allocate portfolio βs to individual stocks but use firm-specific values of other variables like size, β may be at a disadvantage in the regressions for individual stocks. This appendix shows, however, that regressions for portfolios, which put β and size on equal footing, produce results comparable to those for individual stocks.

A. Size Portfolios

Table AI shows average monthly returns and market βs for 12 portfolios of NYSE stocks formed on the basis of size (ME) at the end of each year from 1940 to 1989. For these size portfolios, there is a strong positive relation between average return and β. Average returns fall from 1.96% per month for the smallest ME portfolio (1A) to 0.93% for the largest (10B) and β falls from 1.60 to 0.95. (Note also that, as claimed earlier, estimating β as the sum of the slopes in the regression of a portfolio's return on the current and prior month's NYSE value-weighted return produces much larger βs for the smallest ME portfolios and slightly smaller βs for the largest ME portfolios.)

The FM regressions in Table AI confirm the positive simple relation between average return and β for size portfolios. In the regressions of the size-portfolio returns on β alone, the average premium for a unit of β is 1.45% per month. In the regressions of individual stock returns on β (where stocks are assigned the β of their size portfolio), the premium for a unit of β is 1.39%. Both estimates are about 3 standard errors from 0. Moreover, the βs of size portfolios do not leave a residual size effect; the average residuals from the simple regressions of returns on β in Table AI show no relation to size. These positive SLB results for 1941–1990 are like those obtained by Chan and Chen (1988) in tests on size portfolios for 1954–1983.

There is, however, evidence in Table AI that all is not well with the βs of the size portfolios. They do a fine job on the relation between size and average return, but they do a lousy job on their main task, the relation between β and average return. When the residuals from the regressions of returns on β are grouped using the pre-ranking βs of individual stocks, the average residuals are strongly positive for low-β stocks (0.51% per month for group 1A) and negative for high-β stocks (−1.05% for 10B). Thus the market lines estimated with size-portfolio βs exaggerate the tradeoff of average return for β; they underestimate average returns on low-β stocks and overestimate average returns on high-β stocks. This pattern in the β-sorted average residuals for individual stocks suggests that (a) there is variation in β across stocks that is lost in the size portfolios, and (b) this variation in β is not rewarded as well as the variation in β that is related to size.

B. Two-Pass Size-β Portfolios

Like Table I, Table AII shows that subdividing size deciles using the (pre-ranking) βs of individual stocks results in strong variation in β that is

Table AI

Average Returns, Post-Ranking βs and Fama-MacBeth Regression Slopes for Size Portfolios of NYSE Stocks: 1941–1990

At the end of each year $t - 1$, stocks are assigned to 12 portfolios using ranked values of ME. Included are all NYSE stocks that have a CRSP price and shares for December of year $t - 1$ and returns for at least 24 of the 60 months ending in December of year $t - 1$ (for pre-ranking β estimates). The middle 8 portfolios cover size deciles 2 to 9. The 4 extreme portfolios (1A, 1B, 10A, and 10B) split the smallest and largest deciles in half. We compute equal-weighted returns on the portfolios for the 12 months of year t using all surviving stocks. Average Return is the time-series average of the monthly portfolio returns for 1941–1990, in percent. Average firms is the average number of stocks in the portfolios each month. The simple βs are estimated by regressing the 1941–1990 sample of post-ranking monthly returns for a size portfolio on the current month's value-weighted NYSE portfolio return. The sum βs are the sum of the slopes from a regression of the post-ranking monthly returns on the current and prior month's VW NYSE returns.

The independent variables in the Fama-MacBeth regressions are defined for each firm at the end of December of each year $t - 1$. Stocks are assigned the post-ranking (sum) β of the size portfolio they are in at the end of year $t - 1$. ME is price times shares outstanding at the end of year $t - 1$. In the individual-stock regressions, these values of the explanatory variables are matched with CRSP returns for each of the 12 months of year t. The portfolio regressions match the equal-weighted portfolio returns with the equal-weighted averages of β and ln(ME) for the surviving stocks in each month of year t. Slope is the average of the (600) monthly FM regression slopes and SE is the standard error of the average slope. The residuals from the monthly regressions for year t are grouped into 12 portfolios on the basis of size (ME) or pre-ranking β (estimated with 24 to 60 months of data, as available) at the end of year $t - 1$. The average residuals are the time-series averages of the monthly equal-weighted portfolio residuals, in percent. The average residuals for regressions (1) and (2) (not shown) are quite similar to those for regressions (4) and (5) (shown).

	Portfolios Formed on Size											
	1A	1B	2	3	4	5	6	7	8	9	10A	10B
Ave. return	1.96	1.59	1.44	1.36	1.28	1.24	1.23	1.17	1.15	1.13	0.97	0.93
Ave. firms	57	56	110	107	107	108	111	113	115	118	59	59
Simple β	1.29	1.24	1.21	1.19	1.16	1.13	1.13	1.12	1.09	1.05	1.00	0.98
Standard error	0.07	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01
Sum β	1.60	1.44	1.37	1.32	1.26	1.23	1.19	1.17	1.12	1.06	0.99	0.95
Standard error	0.10	0.06	0.05	0.04	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 29 of 40

Table AI—*Continued*

	Portfolio Regressions				Individual Stock Regressions			
	(1) β	(2) ln(ME)	(3) β and ln(ME)		(4) β	(5) ln(ME)	(6) β and ln(ME)	
Slope	1.45	−0.137	3.05	0.149	1.39	−0.133	0.71	−0.060
SE	0.47	0.044	1.51	0.115	0.46	0.043	0.81	0.062

Average Residuals for Stocks Grouped on Size

	1A	1B	2	3	4	5	6	7	8	9	10A	10B
Regression (4)	0.17	0.00	−0.04	−0.06	−0.05	−0.04	0.00	−0.03	0.03	0.08	0.01	0.04
Standard error	0.11	0.06	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.05	0.06
Regression (5)	0.30	0.02	−0.05	−0.06	−0.08	−0.07	−0.03	−0.04	0.02	0.08	0.01	0.13
Standard error	0.14	0.07	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.04	0.07
Regression (6)	0.20	0.02	−0.05	−0.07	−0.08	−0.06	−0.01	−0.02	0.04	0.09	0.00	0.06
Standard error	0.10	0.06	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.05	0.05

Average Residuals for Stocks Grouped on Pre-Ranking β

	1A	1B	2	3	4	5	6	7	8	9	10A	10B
Regression (4)	0.51	0.61	0.38	0.32	0.16	0.12	0.03	−0.10	−0.27	−0.31	−0.66	−1.05
Standard error	0.21	0.19	0.13	0.08	0.04	0.03	0.04	0.05	0.09	0.11	0.18	0.23
Regression (5)	−0.10	0.00	0.02	0.09	0.05	0.07	0.05	0.00	−0.03	−0.01	−0.11	−0.33
Standard error	0.11	0.10	0.07	0.05	0.04	0.03	0.03	0.04	0.05	0.07	0.10	0.13
Regression (6)	0.09	0.25	0.13	0.19	0.11	0.14	0.09	0.01	−0.11	−0.12	−0.38	−0.70
Standard error	0.41	0.37	0.24	0.14	0.07	0.04	0.04	0.09	0.16	0.21	0.34	0.43

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 30 of 40

Table AII

Properties of Portfolios Formed on Size and Pre-Ranking β: NYSE Stocks Sorted by ME (Down) then Pre-Ranking β (Across): 1941-1990

At the end of year $t - 1$, the NYSE stocks on CRSP are assigned to 10 size (ME) portfolios. Each size decile is subdivided into 10 β portfolios using pre-ranking βs of individual stocks, estimated with 24 to 60 monthly returns (as available) ending in December of year $t - 1$. The equal-weighted monthly returns on the resulting 100 portfolios are then calculated for year t. The average returns are the time-series averages of the monthly returns, in percent. The post-ranking βs use the full 1941-1990 sample of post-ranking returns for each portfolio. The pre- and post-ranking βs are the sum of the slopes from a regression of monthly returns on the current and prior month's NYSE value-weighted market return. The average size for a portfolio is the time-series average of each month's average value of ln(ME) for stocks in the portfolio. ME is denominated in millions of dollars. There are, on average, about 10 stocks in each size-β portfolio each month. The All column shows parameter values for equal-weighted size-decile (ME) portfolios. The All rows show parameter values for equal-weighted portfolios of the stocks in each β group.

	All	Low-β	β-2	β-3	β-4	β-5	β-6	β-7	β-8	β-9	High-β
Panel A: Average Monthly Return (in Percent)											
All		1.22	1.30	1.32	1.35	1.36	1.34	1.29	1.34	1.14	1.10
Small-ME	1.78	1.74	1.76	2.08	1.91	1.92	1.72	1.77	1.91	1.56	1.46
ME-2	1.44	1.41	1.35	1.33	1.61	1.72	1.59	1.40	1.62	1.24	1.11
ME-3	1.36	1.21	1.40	1.22	1.47	1.34	1.51	1.33	1.57	1.33	1.21
ME-4	1.28	1.26	1.29	1.19	1.27	1.51	1.30	1.19	1.56	1.18	1.00
ME-5	1.24	1.22	1.30	1.28	1.33	1.21	1.37	1.41	1.31	0.92	1.06
ME-6	1.23	1.21	1.32	1.37	1.09	1.34	1.10	1.40	1.21	1.22	1.08
ME-7	1.17	1.08	1.23	1.37	1.27	1.19	1.34	1.10	1.11	0.87	1.17
ME-8	1.15	1.06	1.18	1.26	1.25	1.26	1.17	1.16	1.05	1.08	1.04
ME-9	1.13	0.99	1.13	1.00	1.24	1.28	1.31	1.15	1.11	1.09	1.05
Large-ME	0.95	0.99	1.01	1.12	1.01	0.89	0.95	0.95	1.00	0.90	0.68

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 31 of 40

Table AII—*Continued*

	All	Low-β	β-2	β-3	β-4	β-5	β-6	β-7	β-8	β-9	High-β
					Panel B: Post-Ranking β						
All		0.76	0.95	1.05	1.14	1.22	1.26	1.34	1.38	1.49	1.69
Small-ME	1.52	1.17	1.40	1.31	1.50	1.46	1.50	1.69	1.60	1.75	1.92
ME-2	1.37	0.86	1.09	1.12	1.24	1.39	1.42	1.48	1.60	1.69	1.91
ME-3	1.32	0.88	0.96	1.18	1.19	1.33	1.40	1.43	1.56	1.64	1.74
ME-4	1.26	0.69	0.95	1.06	1.15	1.24	1.29	1.46	1.43	1.64	1.83
ME-5	1.23	0.70	0.95	1.04	1.10	1.22	1.32	1.34	1.41	1.56	1.72
ME-6	1.19	0.68	0.86	1.04	1.13	1.20	1.20	1.35	1.36	1.48	1.70
ME-7	1.17	0.67	0.88	0.95	1.14	1.18	1.26	1.27	1.32	1.44	1.68
ME-8	1.12	0.64	0.83	0.99	1.06	1.14	1.14	1.21	1.26	1.39	1.58
ME-9	1.06	0.68	0.81	0.94	0.96	1.06	1.11	1.18	1.22	1.25	1.46
Large-ME	0.97	0.65	0.73	0.90	0.91	0.97	1.01	1.01	1.07	1.12	1.38
					Panel C: Average Size (ln(ME))						
All		4.39	4.39	4.40	4.40	4.39	4.40	4.38	4.37	4.37	4.34
Small-ME	1.93	2.04	1.99	2.00	1.96	1.92	1.92	1.91	1.90	1.87	1.80
ME-2	2.80	2.81	2.79	2.81	2.83	2.80	2.79	2.80	2.80	2.79	2.79
ME-3	3.27	3.28	3.27	3.28	3.27	3.27	3.28	3.29	3.27	3.27	3.26
ME-4	3.67	3.67	3.67	3.67	3.68	3.68	3.67	3.68	3.66	3.67	3.67
ME-5	4.06	4.07	4.06	4.05	4.06	4.07	4.06	4.05	4.05	4.06	4.06
ME-6	4.45	4.45	4.44	4.46	4.45	4.45	4.45	4.45	4.44	4.45	4.45
ME-7	4.87	4.86	4.87	4.86	4.87	4.87	4.88	4.87	4.87	4.85	4.87
ME-8	5.36	5.38	5.38	5.38	5.35	5.36	5.37	5.37	5.36	5.35	5.34
ME-9	5.98	5.96	5.98	5.99	6.00	5.98	5.98	5.97	5.95	5.96	5.96
Large-ME	7.12	7.10	7.12	7.16	7.17	7.20	7.29	7.14	7.09	7.04	6.83

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 32 of 40

independent of size. The β sort of a size decile always produces portfolios with similar average ln(ME) but much different (post-ranking) βs. Table AII also shows, however, that investors are not compensated for the variation in β that is independent of size. Despite the wide range of βs in each size decile, average returns show no tendency to increase with β. AII

The FM regressions in Table AIII formalize the roles of size and β in NYSE average returns for 1941–1990. The regressions of returns on β alone show that using the βs of the portfolios formed on size and β, rather than size alone, causes the average slope on β to fall from about 1.4% per month (Table AI) to about 0.23% (about 1 standard error from 0). Thus, allowing for variation in β that is unrelated to size flattens the relation between average return and β, to the point where it is indistinguishable from no relation at all.

The flatter market lines in Table AIII succeed, however, in erasing the negative relation between β and average residuals observed in the regressions of returns on β alone in Table AI. Thus, forming portfolios on size and β (Table AIII) produces a better description of the simple relation between average return and β than forming portfolios on size alone (Table AI). This improved description of the relation between average return and β is evidence that the β estimates for the two-pass size-β portfolios capture variation in true βs that is missed when portfolios are formed on size alone.

Unfortunately, the flatter market lines in Table AIII have a cost, the emergence of a residual size effect. Grouped on the basis of ME for individual stocks, the average residuals from the univariate regressions of returns on the βs of the 100 size-β portfolios are strongly positive for small stocks and negative for large stocks (0.60% per month for the smallest ME group, 1A, and -0.27% for the largest, 10B). Thus, when we allow for variation in β that is independent of size, the resulting βs leave a large size effect in average returns. This residual size effect is much like that observed by Banz (1981) with the βs of portfolios formed on size and β.

The correlation between size and β is -0.98 for portfolios formed on size alone. The independent variation in β obtained with the second-pass sort on β lowers the correlation to -0.50. The lower correlation means that bivariate regressions of returns on β and ln(ME) are more likely to distinguish true size effects from true β effects in average returns.

The bivariate regressions (Table AIII) that use the βs of the size-β portfolios are more bad news for β. The average slopes for ln(ME) are close to the values in the univariate size regressions, and almost 4 standard errors from 0, but the average slopes for β are negative and less than 1 standard error from 0. The message from the bivariate regressions is that there is a strong relation between size and average return. But like the regressions in Table AIII that explain average returns with β alone, the bivariate regressions say that there is no reliable relation between β and average returns when the tests use βs that are not close substitutes for size. These uncomfortable SLB results for NYSE stocks for 1941–1990 are much like those for NYSE, AMEX, and NASDAQ stocks for 1963–1990 in Table III.

C. Subperiod Diagnostics

Our results for 1941–1990 seem to contradict the evidence in Black, Jensen, and Scholes (BJS) (1972) and Fama and MacBeth (FM) (1973) that there is a reliable positive relation between average return and β. The βs in BJS and FM are from portfolios formed on β alone, and the market proxy is the NYSE equal-weighted portfolio. We use the βs of portfolios formed on size and β, and our market is the value-weighted NYSE portfolio. We can report, however, that our inference that there isn't much relation between β and average return is unchanged when (a) the market proxy is the NYSE EW portfolio, (b) portfolios are formed on just (pre-ranking) βs, or (c) the order of forming the size-β portfolios is changed from size then β to β then size.

A more important difference between our results and the earlier studies is the sample periods. The tests in BJS and FM end in the 1960s. Table AIV shows that when we split the 50-year 1941–1990 period in half, the univariate FM regressions of returns on β produce an average slope for 1941–1965 (0.50% per month, $t = 1.82$) more like that of the earlier studies. In contrast, the average slope on β for 1966–1990 is close to 0 (-0.02, $t = 0.06$).

But Table AIV also shows that drawing a distinction between the results for 1941–1965 and 1966–1990 is misleading. The stronger tradeoff of average return for β in the simple regressions for 1941–1965 is due to the first 10 years, 1941–1950. This is the only period in Table AIV that produces an average premium for β (1.26% per month) that is both positive and more than 2 standard errors from 0. Conversely, the weak relation between β and average return for 1966–1990 is largely due to 1981–1990. The strong negative average slope in the univariate regressions of returns on β for 1981–1990 (-1.01, $t = -2.10$) offsets a positive slope for 1971–1980 (0.82, $t = 1.27$).

The subperiod variation in the average slopes from the FM regressions of returns on β alone seems moot, however, given the evidence in Table AIV that adding size always kills any positive tradeoff of average return for β in the subperiods. Adding size to the regressions for 1941–1965 causes the average slope for β to drop from 0.50 ($t = 1.82$) to 0.07 ($t = 0.28$). In contrast, the average slope on size in the bivariate regressions (-0.16, $t = -2.97$) is close to its value (-0.17, $t = -2.88$) in the regressions of returns on ln(ME) alone. Similar comments hold for 1941–1950. In short, any evidence of a positive average premium for β in the subperiods seems to be a size effect in disguise.

D. Can the SLB Model Be Saved?

Before concluding that β has no explanatory power, it is appropriate to consider other explanations for our results. One possibility is that the variation in β produced by the β sorts of size deciles in just sampling error. If so, it is not surprising that the variation in β within a size decile is unrelated to average return, or that size dominates β in bivariate tests. The standard errors of the βs suggest, however, that this explanation cannot save the SLB

Table AIII

Average Slopes, Their Standard Errors (SE), and Average Residuals from Monthly FM Regressions for Individual NYSE Stocks and for Portfolios Formed on Size and Pre-Ranking β: 1941-1990

Stocks are assigned the post-ranking β of the size-β portfolio they are in at the end of year $t-1$ (Table AII). ln(ME) is the natural log of price times shares outstanding at the end of year $t-1$. In the individual-stock regressions, these values of the explanatory variables are matched with CRSP returns for each of the 12 months in year t. The portfolio regressions match the equal-weighted portfolio returns for the size-β portfolios (Table AII) with the equal-weighted averages of β and ln(ME) for the surviving stocks in each month of year t. Slope is the time-series average of the monthly regression slopes from 1941-1990 (600 months); SE is the time-series standard error of the average slope.

The residuals from the monthly regressions in year t are grouped into 12 portfolios on the basis of size or pre-ranking β (estimated with 24 to 60 months of returns, as available) as of the end of year $t-1$. The average residuals are the time-series averages of the monthly equal-weighted averages of the residuals in percent. The average residuals (not shown) from the FM regressions (1) to (3) that use the returns on the 100 size-β portfolios as the dependent variable are always within 0.01 of those from the regressions for individual stock returns. This is not surprising given that the correlation between the time-series of 1941-1990 monthly FM slopes on β or ln(ME) for the comparable portfolio and individual stock regressions is always greater than 0.99.

	Portfolio Regressions				Individual Stock Regressions			
	(1) β	(2) ln(ME)	(3) β and ln(ME)		(4) β	(5) ln(ME)	(6) β and ln(ME)	
Slope	0.22	−0.128	−0.13	−0.143	0.24	−0.133	−0.14	−0.147
SE	0.24	0.043	0.21	0.039	0.23	0.043	0.21	0.039

	Average Residuals for Stocks Grouped on Size											
	1A	1B	2	3	4	5	6	7	8	9	10A	10B
Regression (4)	0.60	0.26	0.13	0.06	−0.01	−0.03	−0.03	−0.09	−0.10	−0.11	−0.25	−0.27
Standard error	0.21	0.10	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.06	0.08
Regression (5)	0.30	0.02	−0.05	−0.06	−0.08	−0.07	−0.03	−0.04	0.02	0.08	0.01	0.13
Standard error	0.14	0.07	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.04	0.07
Regression (6)	0.31	0.02	−0.05	−0.06	−0.09	−0.07	−0.03	−0.04	0.02	0.08	0.01	0.13
Standard error	0.14	0.07	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.04	0.07

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 35 of 40

Table AIII—*Continued*

Portfolio Regressions			Individual Stock Regressions		
(1) β	(2) ln(ME)	(3) β and ln(ME)	(4) β	(5) ln(ME)	(6) β and ln(ME)

Average Residuals for Stocks Grouped on Pre-Ranking β

	1A	1B	2	3	4	5	6	7	8	9	10A	10B
Regression (4)	−0.08	0.03	−0.01	0.08	0.04	0.08	0.04	0.02	−0.03	0.02	−0.11	−0.32
Standard error	0.07	0.05	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.06	0.07
Regression (5)	−0.10	0.00	0.02	0.09	0.05	0.07	0.05	0.00	−0.03	−0.01	−0.11	−0.33
Standard error	0.11	0.10	0.07	0.05	0.04	0.03	0.03	0.04	0.05	0.07	0.10	0.13
Regression (6)	−0.17	−0.07	−0.02	0.07	0.04	0.06	0.05	0.03	0.00	0.04	−0.04	−0.23
Standard error	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.06	0.07

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 36 of 40

Table AIV

Subperiod Average Returns on the NYSE Value-Weighted and Equal-Weighted Portfolios and Average Values of the Intercepts and Slopes for the FM Cross-Sectional Regressions of Individual Stock Returns on β and Size (ln(ME))

Mean is the average VW or EW return or an average slope from the monthly cross-sectional regressions of individual stock returns on β and/or ln(ME). Std is the standard deviation of the time-series of returns or slopes, and t(Mn) is Mean over its time-series standard error. The average slopes (not shown) from the FM regressions that use the returns on the 100 size-β portfolios of Table AII as the dependent variable are quite close to those for individual stock returns. (The correlation between the 1941–1990 month-by-month slopes on β or ln(ME) for the comparable portfolio and individual stock regressions is always greater than 0.99.)

Panel A

	1941–1990 (600 Mos.)			1941–1965 (300 Mos.)			1966–1990 (300 Mos.)		
Variable	Mean	Std	t(Mn)	Mean	Std	t(Mn)	Mean	Std	t(Mn)
	NYSE Value-Weighted (VW) and Equal-Weighted (EW) Portfolio Returns								
VW	0.93	4.15	5.49	1.10	3.58	5.30	0.76	4.64	2.85
EW	1.12	5.10	5.37	1.33	4.42	5.18	0.91	5.70	2.77
	$R_{it} = a + b_{1t}\beta_{it} + e_{it}$								
a	0.98	3.93	6.11	0.84	3.18	4.56	1.13	4.57	4.26
b_1	0.24	5.52	1.07	0.50	4.75	1.82	−0.02	6.19	−0.06
	$R_{it} = a + b_{2t}\ln(ME_{it}) + e_{it}$								
a	1.70	8.24	5.04	1.88	6.43	5.06	1.51	9.72	2.69
b_2	−0.13	1.06	−3.07	−0.17	1.01	−2.88	−0.10	1.11	−1.54
	$R_{it} = a + b_{1t}\beta_{it} + b_{2t}\ln(ME_{it}) + e_{it}$								
a	1.97	6.16	7.84	1.80	4.77	6.52	2.14	7.29	5.09
b_1	−0.14	5.05	−0.66	0.07	4.15	0.28	−0.34	5.80	−1.01
b_2	−0.15	0.96	−3.75	−0.16	0.94	−2.97	−0.13	0.99	−2.34

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 37 of 40

Table AIV—*Continued*

Panel B:

Return	1941–1950 Mean	1941–1950 t(Mn)	1951–1960 Mean	1951–1960 t(Mn)	1961–1970 Mean	1961–1970 t(Mn)	1971–1980 Mean	1971–1980 t(Mn)	1981–1990 Mean	1981–1990 t(Mn)
NYSE Value-Weighted (VW) and Equal-Weighted (EW) Portfolio Returns										
VW	1.05	2.88	1.18	3.95	0.66	1.84	0.72	1.67	1.04	2.40
EW	1.59	3.16	1.13	3.76	0.88	1.96	1.04	1.82	0.95	2.01
$R_{it} = a + b_{1t}\beta_{it} + e_{it}$										
a	0.24	0.66	1.41	6.36	0.64	1.94	0.27	0.62	2.35	5.99
b_1	1.26	2.20	−0.19	−0.63	0.32	0.72	0.82	1.27	−1.01	−2.10
$R_{it} = a + b_{2t}\ln(ME_{it}) + e_{it}$										
a	2.63	3.47	1.08	2.73	1.78	2.50	2.18	2.03	0.82	1.20
b_2	−0.37	−2.90	0.03	0.53	−0.17	−2.19	−0.20	−1.57	0.04	0.57
$R_{it} = a + b_{1t}\beta_{it} + b_{2t}\ln(ME_{it}) + e_{it}$										
a	2.14	3.93	1.38	4.03	2.01	4.16	1.50	2.12	2.84	4.25
b_1	0.34	0.75	−0.17	−0.53	−0.11	−0.27	0.41	0.75	−1.14	−2.16
b_2	−0.34	−2.92	0.01	0.20	−0.18	−2.89	−0.16	−1.50	−0.07	−0.84

KY PSC Case No. 2016-00162, Attachment I to AG 1-25
Page 38 of 40

model. The standard errors for portfolios formed on size and β are only slightly larger (0.02 to 0.11) than those for portfolios formed on size alone (0.01 to 0.10, Table AI). And the range of the post-ranking βs within a size decile is always large relative to the standard errors of the βs.

Another possibility is that the proportionality condition (1) for the variation through time in true βs, that justifies the use of full-period post-ranking βs in the FM tests, does not work well for portfolios formed on size and β. If this is a problem, post-ranking βs for the size-β portfolios should not be highly correlated across subperiods. The correlation between the half-period (1941–1965 and 1966–1990) βs of the size-β portfolios is 0.91, which we take to be good evidence that the full-period β estimates for these portfolios are informative about true βs. We can also report that using 5-year βs (pre- or post-ranking) in the FM regressions does not change our negative conclusions about the role of β in average returns, as long as portfolios are formed on β as well as size, or on β alone.

Any attempt to salvage the simple positive relation between β and average return predicted by the SLB model runs into three damaging facts, clear in Table AII. (a) Forming portfolios on size and pre-ranking βs produces a wide range of post-ranking βs in every size decile. (b) The post-ranking βs closely reproduce (in deciles 2 to 10 they exactly reproduce) the ordering of the pre-ranking βs used to form the β-sorted portfolios. It seems safe to conclude that the increasing pattern of the post-ranking βs in every size decile captures the ordering of the true βs. (c) Contrary to the SLB model, the β sorts do not produce a similar ordering of average returns. Within the rows (size deciles) of the average return matrix in Table AII, the high-β portfolios have average returns that are close to or less than the low-β portfolios.

But the most damaging evidence against the SLB model comes from the univariate regressions of returns on β in Table AIII. They say that when the tests allow for variation in β that is unrelated to size, the relation between β and average return for 1941–1990 is weak, perhaps nonexistent, even when β is the only explanatory variable. We are forced to conclude that the SLB model does not describe the last 50 years of average stock returns.

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Financial News

By Michael Annin

Equity and the Small-Stock Effect

The capital asset pricing model shows risk inherent in return on equity. But something goes wrong when it's used for small-sized companies.

Does the size of a company affect the rate of return it should earn? If smaller companies should earn a higher return than larger firms, then small utilities, because of their size, should be allowed to adjust the rates they charge to customers.

By far the most notable and well-documented apparent anomaly in the stock market is the effect of company size on equity returns. The first study focusing on the impact that company size exerts on security returns was performed by Rolf W. Banz. Banz sorted New York Stock Exchange (NYSE) stocks into quintiles based on their market capitalization (price per share times number of shares outstanding), and calculated total returns for a value-weighted portfolio of the stocks in each quintile. His results indicate that returns for companies from the smallest quintile surpassed all other quintiles, as well as the Standard & Poor's 500 and other large stock indices. A number of other researchers have replicated Banz's work in other countries; nevertheless, a consensus has not yet been formed on why small stocks behave as they do.

One explanation for the higher returns is the lack of information on small companies. Investors must search more diligently for data. For small utilities, investors face additional obstacles, such as a smaller customer base, limited financial resources, and a lack of diversification across customers, energy sources, and geography. These obstacles imply a higher investor return.

The Flaw in CAPM

One of the more common cost of equity models used in practice today is the capital asset pricing model (CAPM). The CAPM describes the expected return on any company's stock as proportional to the amount of systematic risk an investor assumes. The traditional CAPM formula can be stated as:

$$R_s = [\beta_s \times RP] + R_f$$

where:

R_s = expected return or cost of equity on the stock of company "s"

β = the *beta* of the stock of company "s"

RP = the expected equity risk premium

R_f = expected return on a riskless asset.

Table 1: The Size Premium in CAPM
(By Decile Portfolio in NYSE, 1926-94)

Decile	*Beta*	Arithmetic Mean Return	Actual Return in Excess of Riskless Rate	CAPM Return in Excess of Riskless Rate**	Size Premium (Return in Excess CAPM)
1	0.90	11.01%	5.88%	6.33%	−0.44%
2	1.04	13.09	7.97	7.34	0.63
3	1.09	13.83	8.71	7.70	1.01
4	1.13	14.44	9.32	7.98	1.33
5	1.17	15.50	10.38	8.22	2.16
6	1.19	15.45	10.33	8.38	1.95
7	1.24	15.92	10.79	8.75	2.05
8	1.29	16.84	11.72	9.05	2.67
9	1.36	17.83	12.71	9.57	3.14
10	1.47	21.98	16.86	10.33	6.53

**Betas* are estimated from monthly returns in excess of the 20-year government bond income return, January 1926-December 1994.
**Historical riskless rate measured by the 69-year arithmetic mean income return component of 20-year government bonds.
Source: SBBI 1995 Yearbook

Table 2: CAPM vs. CAPM w/ Size Premium

(By Percentile for Electric, Gas, and Sanitary Services Utilities)

	CAPM	CAPM with Size Premium
90th Percentile	16.42%	18.92%
75th Percentile	12.56%	14.72%
Median	10.89%	12.58%
25th Percentile	9.86%	11.39%
10th Percentile	8.63%	10.65%

(Weighted by Market Capitalization)

	CAPM	CAPM with Size Premium
Industry Composite	11.76%	12.33%
Large Company Composite	12.05%	12.07%
Small Company Composite	13.93%	17.95%

Source: Cost of Capital Quarterly '95 Yearbook by Ibbotson Associates
Note: Public utilities include electric, gas, and sanitary services companies.

Table 1 shows *beta* and risk premiums over the past 69 years for each decile of the NYSE. It shows that a hypothetical risk premium calculated under the CAPM fails to match the actual risk premium, shown by actual market returns. The shortfall in the CAPM return rises as company size decreases, suggesting a need to revise the CAPM.

The risk premium component in the actual returns (realized equity risk premium) is the return that compensates investors for taking on risk equal to the risk of the market as a whole (estimated by the 69-year arithmetic mean return on large company stocks, 12.2 percent, less the historical riskless rate). The risk premium in the CAPM returns is *beta* multiplied by the realized equity risk premium.

The smaller deciles show returns not fully explainable by the CAPM. The difference in risk premiums (realized versus CAPM) grows larger as one moves from the largest companies in decile 1 to the smallest in decile 10. The difference is especially pronounced for deciles 9 and 10, which contain the smallest companies.

Based on this analysis, we modify the CAPM formula to include a small-stock premium. The modified CAPM formula can be stated as follows:

$$R_s = [\beta_s \times RP] + R_f + SP$$

where:

SP = small-stock premium.

Because the small-stock premium can be identified by company size, the appropriate premium to add for any particular company will depend on its equity capitalization. For instance, a utility with a market capitalization of $1 billion would require a small capitalization adjustment of approximately 1.3 percent over the traditional CAPM; at $400 million, approximately 2.1 percent, and at only $100 million, approximately 4 percent.

Again, these additions to the traditional CAPM represent an adjustment over and above any increase already provided to these smaller companies by having higher *betas*.

Implications for Smaller Utilities

These findings carry important ramifications for relatively small public utilities. Boosting the traditional CAPM return by a full 400 basis points for small utilities translates into a substantial premium over larger utilities.

Table 2 shows the results of an analysis of 202 utility companies that calculated cost of equity figures. Composites (arithmetic means) weighted by equity capitalization were also calculated for the largest and smallest 20 companies. The results show the impact size has on cost of equity.

For the traditional CAPM, the large-company composite shows a cost of equity of 12.05 percent; the small company composite, 13.93 percent. However, once the respective small capitalization premium is added in, the spread increases dramatically, to 12.07 and 17.95 percent, respectively. Clearly, the smaller the utility (in terms of equity capitalization), the larger the impact that size exerts on the expected return of that security. ▼

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Table 7-5 **Decile Portfolios of the NYSE** Bounds, Size, and Composition

From 1926 to 1994

Decile	Historical Average Percentage of Total Capitalization	Recent Number of Companies	Recent Decile Market Capitalization (in thousands)	Recent Percentage of Total Capitalization
1-Largest	62.34	168	2,384,444,683	63.19%
2	15.41	167	585,938,436	15.52
3	8.56	168	306,811,948	8.13
4	5.18	168	187,218,791	4.96
5	3.32	167	121,844,654	3.23
6	2.15	168	81,362,005	2.16
7	1.39	168	49,092,923	1.30
8	0.89	167	32,431,847	0.86
9	0.53	168	17,552,595	0.46
10-Smallest	0.23	168	6,970,879	0.18
Mid-Cap 3–5	17.06	503	615,875,394	16.32
Low-Cap 6–8	4.43	503	162,886,775	4.32
Micro-Cap 9–10	0.76	336	24,523,475	0.65

Source: Center for Research in Security Prices, University of Chicago

Historical average percentage of total capitalization shows the average, over the last 69 years, of the decile market values as a percentage of the total NYSE calculated each year. Number of companies in deciles, recent market capitalization of deciles and recent percentage of total capitalization are as of September 30, 1994.

Decile	Recent Market Capitalization	Company Name
1-Largest	$84,752,352,000	AT&T Corporation
2	5,071,977,000	Alltel Corporation
3	2,570,451,000	Citizens Utilities Corporation
4	1,462,677,000	Owens Corning Fiberglass Corporation
5	915,547,750	Tosco Corporation
6	617,148,250	Enterra Corporation
7	403,901,625	Commonwealth Energy Systems
8	241,976,250	Zurn Industries Incorporated
9	149,297,500	Oneida Limited
10-Smallest	70,284,375	Mestek Incorporated

Source: Center for Research in Security Prices, University of Chicago.

Market capitalization and name of largest company in each decile as of September 30, 1994.